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# **The Indian Animal Sciences ABSTRACTS**



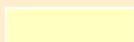
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# **The Indian Animal Sciences ABSTRACTS**



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Project Director (DKMA) : Dr Rameshwar Singh

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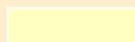
*Information Systems Officer*

V.S. Kaushik

*Technical Officer*

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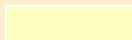
### SAMPLE ENTRY

1 ← 001 Paul, P.R.C.; Xavier, F.; Leena, A. (College of Veterinary and Animal Sciences, Trissur (India), Department, of Livestock Production Management) Dairysoft: A computer programme for dairy farms. Indian Journal of Animal Sciences (India). (Mar 2006).v. 76(3) p. 260-262 KEYWORDS: DAIRY FARMS; COMPUTER SOFTWARE

Annotations: 2 (above Paul), 6 (above Leena), 3 (right of Management), 4 (right of p.), 5 (right of KEYWORDS)

To exploit the full potential of dairy sector, a computerized record management system dairysoft was developed. Visual Basis 6.0 was used as front end while MSAccess 97 was utilized as back end for the software. The menu base dairysoft was provided with facilities for obtaining necessary reports along with separate data entry options.

1. Entry number
2. Author(s)
3. Title in English
4. Source
5. Keywords
6. Organisation where work was carried out



## **C20 Extension**

**214.** Ravikumar, R.K.; Indian Veterinary Research Institute, Izatnagar (India). Chander, M.; Indian Veterinary Research Institute, Izatnagar (India). Livestock extension education activities of the State Departments of Animal Husbandry (SDAH) in India: A case of Tamil Nadu state. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 757-762 KEYWORDS: ANIMAL HUSBANDRY. EXTENSION ACTIVITIES. ANIMAL PRODUCTION. FARMS. TAMIL NADU.

The State Departments of Animal Husbandry (SDAH) are the major stakeholder for the delivery of extension education services to the Livestock Owners (LOs) in India. However, the SDAH have to perform multitudes of other function with major emphasis on animal health. Thus, to test the hypothesis that the SDAH are not performing their role regarding delivery of extension services to the expected level, a survey of LOs, Veterinary Assistant Surgeons (VASs) and livestock inspectors (LIs) was undertaken in the state of Tamil Nadu. The SDAH, Tamil Nadu was primarily catering to animal health and breeding needs. There was no well defined institutional structure, catering specifically towards extension education activities oriented to livestock development. The grassroots level extension functionaries especially the veterinarians considered the extension activities as low profile job. Whereas, the LOs considered the SDAH as the major source of information relating to livestock health and production, but the functionaries of SDAH were not exposed to various extension-teaching methods for the want of budget, infrastructure and low priority attached to this role in preference to other activities. The economic importance of information was well recognized by the LOs, the Director of SDAH and extension functionaries within the SDAH, yet the institutional mechanism was not geared to this need of LOs. The budgetary provisions for extension education activities was limited to less than 1%, while 5% of the total budget was considered appropriate by the concerned officials. Therefore, a need was felt for a separate unit within the SDAH for effective delivery of extension services to the livestock farmers.

**215.** Srinivasa Reddy, M.; College of Veterinary Science, Hyderabad (India) Department of Veterinary & A.H.Extension.Sudhakar Rao, B; College of Veterinary Science, Hyderabad (India) Department of Veterinary & A.H.Extension.. Relationship between Affordability to pay for the Veterinary Services and profile characteristics of Dairy farmers. Veterinary World (India). (Jun 2011) v.4(6) p. 266-168 KEYWORDS: DAIRY FARMS. FARM INCOME. FARMERS. VETERINARY SERVICES. INDIA.

An Ex-post facto research design was adopted to study the affordability of dairy farmers to pay for the veterinary services and their relationship with personal and selected psychological characteristics. Majority of the dairy farmers possessed medium affordability followed by less affordability to pay for the veterinary services. Correlation analysis indicated that all the variables except age have got positive and significant correlation with the affordability to pay for the veterinary services. The variable age was negative and significantly correlated with affordability to pay for the veterinary services. Regression analysis indicated that all the variables selected for study put together contributed for explaining 74.5% of variation in the dependent variable i.e affordability to pay for the services. The profile characteristics of dairy farmers like education, information seeking behaviour, scientific orientation, economic orientation and market orientation had significantly positive influence on their affordability to pay for the veterinary services; while age and management orientation had significant negative impact on the same. The contribution of the remaining 5 variables was not significant.

**216.** Mohanasundarraaj, G.B.; Indian Veterinary Research Institute, Izatnagar (India). Division of Extension Education. Tripathi, Hema; Indian Veterinary Research Institute, Izatnagar (India). Division of Extension Education.. Role Performance in Goat Farming Activities in Southern Zone of India: A Gender Perspective. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 83-87 KEYWORDS: GOATS. ANIMAL HUSBANDRY. ROLE OF WOMEN.

The present study was conducted to study the role performance in goat farming activities in Tamil Nadu. The data were collected personally from 120 goat owning farm families with the help of structured interview schedule developed for the study. In goat farming, independent participation of women was noticed in the practices of colostrum feeding, grazing of animals, collection and disposal of pellets, feeding, watering, care of pregnant animals, care at kidding time, providing special feed to kidded animals and cleaning of pens. Joint participation with the spouse, however was found in the activities like cleaning and grooming of animals, chaffing of fodder, care of young one immediately after birth, providing special feed and medicine to sick and deworming of animals. Males were more involved in health care, decision making and marketing related activities. It was concluded that goat keeping was an integral part of livelihood of rural families. Rural women were the active workers in most of the indoor activities of goat farming whereas males were engaged more in outdoor activities. Both men and women were managing the activities of goat farming. Thus they may be encouraged to take goat farming as entrepreneurial activity for

better earning and sustainable livelihood.

### **E10 Agricultural economics and policies**

**217.** Pathania, M.S.; CSK Himachal Pradesh Krishi Vishvvidyalya, Palampur (India).Inder Dev; CSK Himachal Pradesh Krishi Vishvvidyalya, Palampur (India).. Fodder supply from public and private lands in two agro-climatic zones of Himachal Pradesh. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 740-743  
KEYWORDS: LIVESTOCK. FORAGE. AGROCLIMATIC ZONES. FARM SIZE. HIMACHAL PRADESH.

A field study of 200 sample household was conducted in 2 agro-climatic zones of Himachal Pradesh to understand the availability of different fodder from varied sources. The availability of different type of fodder from owned lands increased with increase in farm size, while the quantity of these fodders from public lands decreased with increase in farm size. The productivity of fodder in CPR lands was very low due to plantation of pine trees and growth of Lantana and other obnoxious weeds on a large scale. Quantity of green and dry fodder collected by small farmers was higher from owned land as compared to public land. The farm size-wise analysis showed that the marginal farms depends more on public lands as compared to small farms. The grazing of animals on CPR lands was maximum during winter followed by rainy season. During summer, the maximum grazing was on cultivated fields. The average requirement of dry and green fodder for total livestock per household per annum was 73q and 152q, respectively. The green and dry fodder deficit per farm was 39 and 30%, respectively.

**218.** Thirunavukkarasu, M.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India).Sankaran, V.M.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India). Kathiravan, G.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India).Karunakaran, R.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India).. Estimating dry fodder availability and requirement for bovines. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 744-750  
KEYWORDS: BOVINAЕ. DESICCATED FODDERS. NUTRITIONAL REQUIREMENTS. FARM SURVEYS.

The availability and requirement of dry fodder for bovines in Tamil Nadu were estimated in the study. A survey was conducted to ascertain the grain-to-straw ratios in various cereals and pulses crops in 580 farms, randomly selected from across the 7 agro-climatic zones of the State. Secondary data on area and production of various agricultural commodities in the State (2007-08) were also collected

from government and non-government agencies. Based on the ratios assessed and the data collected on production of cereals, pulses and oilseeds in the State, a methodology was framed for estimating dry fodder availability. The requirement of dry fodder for bovines was estimated (i) taking the dry matter requirement of 2.50% per Adult Cattle Unit (ACU) (350 kg body weight) and (ii) taking the requirement of dry fodder as 1 kg of dry fodder/100 kg of body weight. The dry fodder produced from cereals was estimated to be 5.08 million tonnes (66.84% to total dry fodder), with half of it coming from paddy. Dry fodder from pulses in the State was 0.38 million tonnes. Groundnut contributed 28.20% to dry fodder output in State. Total dry fodder requirement for bovines in the State, was 11.77 million tonnes as per procedure 1, and 9.36 million tonnes as per procedure 2, indicating a deficit of 4.17 million tonnes and 1.76 million tonnes, respectively. Total bovine population of the State was 7.33 million ACUs, of which 5.84 million ACUs (79.72%) were cattle and 1.49 million ACUs (20.28%) buffaloes. Dry fodder status also showed a deficit of 0.57 and 0.24 tonne/ACU in the State, in procedure 1 and procedure 2, respectively. All zones in the State showed only deficit status of dry fodder, in both the requirement situations.

## **E20 Organization, administration and management of agricultural enterprises or farms**

**219.** Feroze, S.M.; National Dairy Research Institute, Karnal (India). Chauhan, A.K.; National Dairy Research Institute, Karnal (India). Chakravarty, A.K.; National Dairy Research Institute, Karnal (India).. Microfinance and income from dairy in Haryana: An impact analysis. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 751-756 KEYWORDS: DAIRIES. IMPACT ASSESSMENT. STATISTICAL METHODS. HARYANA.

This paper studies the impact of microfinance through Self Help Groups (SHGs) on income from dairy using with and without (credit) approach. Tabular and regression analysis were employed on primary data collected from a sample of 120 SHG members and 60 non-members randomly selected from 2 districts of Haryana during 2007–08. Average milk production per day per household was higher for members (6.13 litre and 2.85 litre) than non-members (5.85 litre and 2.68 litre) in both, buffalo and cow. Investments on dairy were Rupees 36136 and Rupees 34674 in case of per member and nonmember household, respectively. Per household average annual gross income from dairy was worked out to be higher in member households (Rupees 28256) than non-member households (Rupees 26443). The variable credit turned out to have positive and significant impact on gross income from dairy.

**220.** Kathiravan, G.; Madras Veterinary College, Chennai (India). Thirunavukkarasu, M.; Madras Veterinary College, Chennai (India). Selvam, S.; Madras Veterinary College, Chennai (India).. Time, costs and farmers' perceptions: The case of livestock service delivery in Tamil Nadu. *Veterinary World (India)*. (May 2011) v.4(5) p. 209-211  
KEYWORDS: LIVESTOCK. ANIMAL HUSBANDRY. TAMIL NADU. FARMERS. TIME SERIES ANALYSIS.

A study was undertaken in southern peninsular State of India, the Tamil Nadu State, (i) to ascertain the time costs of animal health care and bovine breeding services, and (ii) to comprehend the perceptions of farmers on the livestock services rendered by different service providers. The districts of the state were categorized as 'Livestock Developed' (LD) and 'Livestock Under Developed' (LUD) based on initial base line developed. Travel, waiting and service time were among the primary non-price factors that affected service quality. Average travel time was highest for visiting the public veterinary centre in both LUD (23.05 min.) and LD (21.32 min.) districts. Waiting time with regard to veterinarians providing home services in LUD districts was highest (23.01 min.), followed by public veterinary centre services at LUD districts (22.35 min.), home services by para-veterinarians (22.01 min.) and public veterinary centre services at LD districts (20.10 min.). Both travel and waiting time were much higher in case of breeding services compared to curative services, which could be due to the fact that the farmers preferred Artificial Insemination (AI) over its close substitute, the natural service. However, the service time was relatively less in case of insemination services vis-à-vis curative services both in LUD and LD districts. The quality perceptions of farmers on livestock services revealed that the home services rendered by veterinarians as the best one (0.83), followed by private veterinary clinics (0.75), home services by para-veterinarians (0.74), public veterinary centres (0.64) and co-operative veterinary centres (0.48).

### **L01 Animal husbandry**

**221.** Pathania M.S.; CSK Himachal Pradesh Krishi Vishvvidyalya, Palampur (India). Sharma S.K.; CSK Himachal Pradesh Krishi Vishvvidyalya, Palampur (India). Impact of Migratory Animals on Grazing Lands: An evidence from Himachal Pradesh. *Indian Journal of Animal Research (India)*. (Mar 2012) v. 46(1) p. 40-45  
KEYWORDS: GRAZING LANDS. GRAZING INTENSITY.

The present study was conducted in the hilly region of himachalpradesh which revealed that the area under forests in different forest circles decreased over time. The migratory livestock

population decreased over period. The availability of grazing lands for migratory animals was higher than the recommended level except in Dharmsala forest circle. The higher pressure on grazing lands was noticed when animal grazed by local people were also considered. The loss of plantation in grazing lands varied from Rs. 268.44 lac to Rs. 285.04 lac in different forest circles over the years. The income generated from migratory animals through wool, milk, meat and FYM was Rs. 44.76 lac in Dharmsala forest circle in 1990–91 to Rs. 775 lac in Chamba during 1999–2000. Besides this, employment of 16,560 man days was also generated in the state through this profession. It was suggested that with increase in human and livestock population, the demand for Common Property Land Resources (CPRs) products has increased which calls for better management of CPRs. The weeds infestation is causing an additional stress and resource competition. Therefore, there is a need to frame a comprehensive policy to eradicate the weeds and to increase the productivity of grasses and income of local people. In the plantation programmes, preference should be given to locally acceptable multi-purpose tree species.

**222.** Pathania M.S.; CSK Himachal Pradesh Krishi Vishvvidyalaya, Palampur (India). Sharma S.K.; CSK Himachal Pradesh Krishi Vishvvidyalaya, Palampur (India).. Impact of Migratory Animals on Grazing Lands: An evidence from Himachal Pradesh. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 40-45 KEYWORDS: GRAZING LANDS. GRAZING INTENSITY.

The present study was conducted in the hilly region of Himachal Pradesh which revealed that the area under forests in different forest circles decreased over time. The migratory livestock population decreased over period. The availability of grazing lands for migratory animals was higher than the recommended level except in Dharmsala forest circle. The higher pressure on grazing lands was noticed when animal grazed by local people were also considered. The loss of plantation in grazing lands varied from Rs. 268.44 lac to Rs. 285.04 lac in different forest circles over the years. The income generated from migratory animals through wool, milk, meat and FYM was Rs. 44.76 lac in Dharmsala forest circle in 1990–91 to Rs. 775 lac in Chamba during 1999–2000. Besides this, employment of 16,560 man days was also generated in the state through this profession. It was suggested that with increase in human and livestock population, the demand for Common Property Land Resources (CPRs) products has increased which calls for better management of CPRs. The weeds infestation is causing an additional stress and resource competition. Therefore, there is a need to frame a comprehensive policy to eradicate the weeds and to increase the productivity of grasses and income of local people. In the plantation

programmes, preferences should be given to locally acceptable multi-purpose tree species.

**223.** Aglave, P.M.; Marathawada Agricultural University, Parbhani (India). Department of Animal Husbandry and Dairy Science. Mitkari, K.R.; Marathawada Agricultural University, Parbhani (India). Department of Animal Husbandry and Dairy Science. Adangale, S.B.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Deshmukh, A.R.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Kale, V.A.; Marathawada Agricultural University, Parbhani (India). Department of Animal Husbandry and Dairy Science. Effect of Non-Genetic Factors on Mortality Pattern in Crossbred Cattle (HF x DEONI) Holdeo. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 74-77 KEYWORDS: CATTLE. CROSSBREDS. MORTALITY.

The studies on the mortality pattern of crossbred animals were conducted at MAU, Parbhani. The data of total 519 animal's mortality were studied and tabulated according to generation, season, sex, age, and cause of mortality. The result revealed the F1 generation proved more susceptible to the situation than interse progeny. The highest overall mortality was observed in season S3-summer (9.28 per cent), season S1-Monsoon (7.43 per cent) and S2-winter (5.08 per cent) respectively. There was a non-significant effect of sex on mortality pattern in all genetic groups; however, higher mortality seems in female calves. Mortality due to cause of Class-II (9.78 per cent) followed by Class-I (4.40 per cent), Class-IV (3.99 per cent), Class-III (2.06 per cent) and Class-V (1.56 per cent) respectively. The mortality percentage of different age group was found as nonsignificant in all generations.

**224.** Das, S.K.; ICAR Research Complex for NEH Region, Barapani (India).. Study on the Different Factors Affecting Mortality Pattern of Rabbit in India. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 89-91 KEYWORDS: RABBITS. MORTALITY. VITALSTATISTICS. INDIA.

Around 374 data on different mortality cases recorded from New Zealand White and Soviet Chinchilla breed of rabbit in three seasons i.e. summer, rainy and winter over a period of four years in Rabbit Research Farm of the institute under Animal Production Division were analyzed statistically. Rabbits were housed in indoor cage system and 50 % mash feeding and 50 % roughage feeding was practiced. It was found that highest mortality was in I st generation crops. Breed wise higher mortality was observed in New Zealand White breed of rabbit (22.12%). Sex wise higher mortality was in female (20.48 %). Age wise mortality revealed that highest mortality was in finisher (21.49 %). Season wise highest mortality was in summer (17.90 %). Etiology of disease indicated that highest

mortality was due to coccidiosis (5.62 %) followed by deficiency disorder (5.50 %). In 1<sup>st</sup> and 2<sup>nd</sup> year there was significant differences (P 0.05) in mortality among grower, finisher and adult rabbits. There were also significant (P 0.05) differences in mortality between different seasons in 1<sup>st</sup> year. There was significant difference of mortality between the generations in 1<sup>st</sup> year. In 2<sup>nd</sup> year breed difference was observed to be significant.

**225.** Amit Kumar; National Dairy Research Institute, Karnal (India). Gandhi, R.S.; National Dairy Research Institute, Karnal (India). Evaluation of pooled lactation production and reproduction traits in Sahiwal cattle. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 600-604 KEYWORDS: CATTLE. LAND RACES. LACTATION. MILK PERFORMANCE.

The pooled lactation records of Sahiwal cows maintained at 3 different farms over a period of 40 years were analysed to evaluate the production and reproduction performance. The overall least squares means of lactation traits for pooled data over the herds and lactations were: 1708.10±11.32 kg for 305DMY, 1793.09±12.63 kg for LMY, 286.32±1.52 days for LL, 155.33±2.15 days for SP, 148.61±1.97 days for DP and 445.92±2.38 days for CI. The effect of herd was significant on all production and reproduction traits. The season was highly significantly influencing 305DMY and LL, whereas it had no significant effect of LMY. The season of calving had significant effect on SP and CI; while it had no significant effect on DP. The effect of period was significant on all production and reproduction traits. The effect of parity was highly significant on all production and reproduction traits. It was observed that first lactation reproduction traits were comparatively of longer duration than the later lactations indicating better reproductive efficiency in later lactations/age of cows.

**226.** Muthukumar, M; National Research Centre on Meat, Hyderabad (India) Sen, A.R.; National Research Centre on Meat, Hyderabad (India) Naveena, B.M.; National Research Centre on Meat, Hyderabad (India) Vaithyanathan, S.; National Research Centre on Meat, Hyderabad (India) Patil, S. Girish; National Research Centre on Meat, Hyderabad (India). Carcass traits and meat quality attributes of broilers grown to different body weights. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 615-620 KEYWORDS: BROILER CHICKENS. CARCASS COMPOSITION.

An experiment was carried out to study the carcass traits, meat quality and processing characteristics of broilers grown to different body weights. Three groups of broiler chicken aged 35, 40 and 45 days, comprising 12 male and 12 female in each group corresponding to light (slaughter weight 1500 g), medium (1500–2000 g) and heavy

(2000 g) were utilized. Carcass traits revealed higher slaughter and dressed carcass weight for males compared to females. Age of birds showed significant effect on dressing percentage and all the age groups differed significantly. However, no significant difference was observed between sexes within each group except in medium weight group, where, male broilers showed higher dressing percentage than females. The dressing per cent increased gradually with age irrespective of sex. The yield (%) of high valued primal cuts like breast, thigh, drumstick and drummets on the basis of dressed carcass weight, increased with age and slaughter weight. No significant effect of sex was observed. The yield of lean meat from breast, thigh, drumstick and drummets were higher in heavy weight group than medium and low weight groups. The meat from heavier birds showed significantly higher water holding capacity, redness value ( $a^*$  value and chroma), Warner-Bratzler shear force value, protein and fat content and lower cook loss and moisture level than medium and light weight groups. Sensory evaluation of chicken nuggets prepared from 3 groups revealed increase in juiciness, texture and overall palatability with increasing slaughter weight, however, the scores did not differ significantly between the weight groups. This study showed that meat produced from heavy weight broilers ( 2000 g live weight) will be beneficial on yield and several quality characteristics and can be economically utilized for production of processed poultry products especially ground and emulsion products.

**227.** Singh, Umesh; Project Directorate on Cattle, Meerut Cantt (India). Arun Kumar; Project Directorate on Cattle, Meerut Cantt (India). Sushil Kumar; Project Directorate on Cattle, Meerut Cantt (India). Beniwal, B.K.; Project Directorate on Cattle, Meerut Cantt (India). Evaluation of Sahiwal cattle for lifetime traits in an organized herd. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 708-710 KEYWORDS: CATTLE. MILK PERFORMANCE. MILK YIELD. LACTATION DURATION. LACTATION NUMBER. LACTATION.

The present study was undertaken on 752 lactation records of 190 Sahiwal cows maintained at Government Sahiwal Cattle Breeding Farm, Chakganjaria, Lucknow, over 17 years (1983–1999) to evaluate the performance of lifetime traits. The traits were considered for study as herd life (longevity), productive herd life, life time calf production, life time milk yield, and total lactation length, age at first service and age at first calving traits. The average herd life (longevity) and productive herd life (PHL) were  $3199.39 \pm 100.48$  days and  $1872.28 \pm 100.28$  days, respectively. The herd life and productive life were significantly influenced by period of birth whereas season of birth had no significant effect. The cows born in the first period (1983–87) had longest herd life ( $3449.25 \pm 166.43$  days) and PHL

(2093.02±166.11 days), however, shortest herd life (2923.59±200.79 days) and productive herd life (1585.80±200.41 days) were observed in the third period (1994–99). The average number of total calves produced by each cow during its life time was 4.19±0.20. It was significantly affected by period of birth whereas season of birth had no effect. The highest number of total calves born was observed in winter season (4.45) and first period of birth (4.55). However, it was lowest in rainy season (3.95) and third period of birth (3.71). The average age at first service and age at first calving were 1053.53±16.85 days and 1329.25±14.53 days, respectively. The average life time milk yield and total lactation length were 5615.98±372.12 kg and 1183.92±67.81 days, respectively. The season and period of birth had no effect on life time milk yield and total lactation length. However significant effects were reported on AFS and AFC. Variability in traits indicated that there is scope of improvement through management.

**228.** Ekambaram, B.; Sri Venkateswara Veterinary University, Hyderabad (India) Gupta, B.R; Sri Venkateswara Veterinary University, Hyderabad (India) Gnana Prakash, M.; Sri Venkateswara Veterinary University, Hyderabad (India) Sudhaker, K.; Sri Venkateswara Veterinary University, Hyderabad (India) Reddy, V.R.; Sri Venkateswara Veterinary University, Hyderabad (India). Housing, breeding and management practices of Mahabubnagar goats. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 875-879  
KEYWORDS: GOATS. ANIMAL HOUSING. ANIMAL HUSBANDRY METHODS. ANDHRA PRADESH.

A study on Mahabubnagar goats of Andhra Pradesh was carried out in 150 households of 56 villages in Mahabubnagar, Nalgonda and Ranga Reddy districts for cataloguing management practices of Mahabubnagar goats. The study revealed that closed type of housing system was adopted by 60% of farmers with thatched roof and kutcha floor. The common feeding practice was grazing (72%), while 27.33% farmers supplemented their animals with concentrates, crop byproducts, etc. during lean periods. The overall flock size was 43.69±1.70 and 58% farmers maintained 26 to 50 goats per flock under field conditions. Majority of the farmers followed 1:21 to 30 sex ratio in their flocks and they did not rotate the breeding bucks as well as did not select breeding males and females. Deworming (82.08%), deticking (6.67%) and vaccination (18.67%) schedules were followed as preventive health measures. Most of the goats were disposed off at villages as per the wishes of butcher, middlemen and traders based on the animal size and shape.

**229.** Yadav, Dinesh Kumar; National Bureau of Animal Genetic Resources, Karnal (India). Arora, Reena; National Bureau of Animal

Genetic Resources, Karnal (India). Bhatia, S.; National Bureau of Animal Genetic Resources, Karnal (India). Gurmej Singh; National Bureau of Animal Genetic Resources, Karnal (India). Morphological characterization, production and reproduction status of Munjal –A threatened sheep population of North-West India. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 943-945 KEYWORDS: SHEEP. BODY CONFORMATION. LAND RACES. REPRODUCTIVE BEHAVIOUR. INDIA.

To characterize Munjal sheep, 107 random sheep flocks were assessed in their breeding tract. Rams (42), ewes (152) and lambs (80) were selected from 32 sheep flocks from 3 different locations for data recording on seven body biometry parameters (body weight, body length, height at wither, chest girth, paunch girth, ear length and tail length). The average adult body weight in rams and ewes was  $60.05 \pm 1.55$  and  $43.95 \pm 0.51$  kg respectively. Body biometry analysis suggested that Munjal sheep are quite large in size, tall, rectangular and massive with long tail. Twinning was 4–10%. The mortality in adults was 5–10% and 4–6% in lambs. Age at puberty in females was 10–12 months. Age at first lambing of ewes was 15–18 months, while age at first breeding of rams was 12–15 months. Due to socio-economic and other factors, shrinkage in breeding tract was observed. The numbers are continuously dwindling and the current population exhibited its threatened status.

**230.** Vijay Avinashilingam, N.A.; National Dairy Research Institute, Karnal (India). Singh, Upayana; National Dairy Research Institute, Karnal (India). Ramkumar; National Dairy Research Institute, Karnal (India). Ascertaining the role performed by the Paniya tribal households in breeding, feeding, healthcare and management practices of dairy farming. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 977-980 KEYWORDS: DAIRY FARMS. ANIMAL HUSBANDRY. ETHNIC GROUPS. ANIMAL HUSBANDRY METHODS. TAMIL NADU.

Agriculture and livestock are complimentary to each other in the Indian farming system in all regions, including the hilly ones. A wide range of hilly people has undertaken milk production as their main occupation. Tamil Nadu is a treasure for indigenous technical knowledge in agriculture and allied activities. According to 1991 census, the total population of the Nilgiris District is 710,214. Out of this, the tribal population accounts for 25,048. There are 36 scheduled tribe communities living in Tamil Nadu. Farm women's contribution in agriculture is not adequately reflected in the available statistics and hence there is need for better understanding in this regard. The studies are lagging in the area of role performance of women in hilly tribal households. So this study clearly stated the regular role and sometimes role played by the females in the dairy

farming activities like attending the animal at the time of parturition, post parturient care, cutting of grass and chopping of straw, grazing, feeding and watering of animals, care of new born calf and sick animals, milking of animals to provide weather protection and preparation of milk products. Whereas, their counterparts performed the outside activities starting from taking animals to the hospital to selling, purchasing of animals and keeping the account of milk products sold.

**231.** Nandi, Debraj; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Roy, Sukanta; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Bera, Santanu; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Kesh, Shyam Sundar; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Samanta, Ashis Kumar; West Bengal University of Animal and Fishery Sciences, Kolkata (India). The rearing system of Black Bengal Goat and their farmers in West Bengal, India. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 254-257  
KEYWORDS: GOATS. LAND RACES. ANIMAL HUSBANDRY METHODS. HERDS. WEST BENGAL.

Bengal Goat is a precious germplasm of West Bengal. Mostly the women (91.3%) of the farming families in West Bengal rear goat. Goat rearing is a subsidiary income source to rural poor along with agriculture. In majority of cases the flock size ranges from 1 to 4 (56%). Male female ratio in adult flock is observed as 1:8 in field condition. The animals are mostly housed along with residential housing (67.1%); houses are mostly kachha type (82.63%) with earthen floor (86.47%) and straw roof (91.33%). All most all the farmers used to graze their goats for feeding. Ponds water is the major source for drinking water (58.14%) of goats. Black Bengal Goats have natural resistant power to many diseases but are vulnerable to cold, water logging situation, diarrhoea, ecto and entro parasitic infestation and respiratory diseases. Under field condition mortality rate is 9.63%.

**232.** Biradar, C. S.; Karnataka State Department of AH & VS, Karnataka (India). Dodamani, M. S.; Karnataka Veterinary and Fishery Science University, Timmapur (India). Inamadar, B. K.; Karnataka State Department of AH & VS, Karnataka (India). Murasalogi, A. J.; Karnataka State Department of AH & VS, Karnataka (India). Organic Poultry Farming in India- issues and approaches. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 273-277  
KEYWORDS: POULTRY FARMING. SMALL FARMS. ANIMAL HUSBANDRY. INDIA.

In the last few decades poultry industry has transformed from mere back yard poultry to commercial farm, but the issues of food safety and quality remains unaddressed. Hence, organic poultry

farming has become as an approach to address these issues. This paper attempts to discuss the various issues of organic farming along with necessary interventions required in poultry breeding, feeding, housing and health care management under Indian Scenario. Further, necessary policy interventions were also suggested in order to promote organic poultry farming.

**233.** Adil, Sheikh; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science & Animal Husbandry, Division of Livestock Production & Management. Banday, Muhammad Tufail; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science & Animal Husbandry, Division of Livestock Production & Management. Salahuddin, Mir; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science & Animal Husbandry, Division of Livestock Production & Management. Bhat, Gulam Ahmad; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science & Animal Husbandry, Division of Livestock Production & Management. Shanaz, Sheikh; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science & Animal Husbandry, Division of Livestock Production & Management.. Effect of organic acids on carcass characteristics of broiler chicken. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 218-222 KEYWORDS: BROILER CHICKENS. CARCASS COMPOSITION.

The effect of organic acids was evaluated in broiler chickens on their carcass characteristics. Birds were divided into seven groups. In the control group, birds were fed diets without any acids (T1) while same diet of experimental groups were supplemented with 2% butyric acid (T2), 3% butyric acid (T4), 2% fumaric acid (T4), 3% fumaric acid (T5), 2% lactic acid (T6) and 3% lactic acid (T7). The body weight gains were improved ( $p < 0.05$ ) by dietary supplementation of organic acids when compared with the control. Use of organic acids had no significant ( $p < 0.05$ ) effect on carcass characteristics of broiler chicken except length and weight of small intestine which were significantly ( $p < 0.05$ ) increased as compared to control.

**234.** Ganai, T.A.S.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Misra, S.S.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Sheikh, F.D.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Description of Changthangi Sheep of Ladakh. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 32-40 KEYWORDS: SHEEP. LAND RACES. ANIMAL PERFORMANCE.

Changthangi sheep, locally known as Changluk, is a potential

breed found in the Changthang area of Leh district of Jammu and Kashmir state. Changthangi sheep are seasonal breeders and the major breeding season is from July to December. This sheep is mainly reared by a nomadic tribe called Changpa alongwith pashmina producing Changthangi goat. The economy of Changpas is largely dependent on animal rearing. It is reared for multiple purposes (mutton, wool, pelt, and manure and dung energy). The Changpas also use the pelts as clothing as well as flooring material, which keeps their tents warm in the freezing temperature. The study was conducted in 12 strata comprising of more than 40 villages and their adjoining areas distributed throughout the breeding tract of this sheep. The data were collected on climate of the breeding tract, managemental practices, physical characteristics, production and reproduction traits, carcass characteristics, disease incidence and mortality traits of Changthangi sheep breed. The population size was declining and their distribution was restricted mainly to Changthang area only. The coat colour was white but some black or brown were also found. The ears were pendulous. Both horned and polled animals are found. The tail is medium to short in length. The males were heavier than the females and superior in different body measurement traits. The average wool production was 1.42 kg. The information generated from the present study can be utilized for developing package of managemental practices, breeding plan and conservation initiatives for this unique sheep breed.

**235.** Das, Arun K.; Central Institute for Research on Goats, Makhdoom (India). Rajkumar, V.; Central Institute for Research on Goats, Makhdoom (India). Singh, S.K.; Central Institute for Research on Goats, Makhdoom (India). Effect of Litter Size on Growth, Carcass and Meat Quality Characteristics of Barbari Kids. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 68-73 KEYWORDS: GOATS. KIDS. CARCASS COMPOSITION. LITTER SIZE.

The influence of litter size on growth, carcass and meat quality characteristics of Barbari kids was investigated. Fourteen Barbari kids were divided equally into two groups and were slaughtered at 14 months of age. Body and carcass measurements, weight at birth and slaughter were evaluated. There was a significant ( $p < 0.05$ ) difference between single and twin born kids, while the effects on slaughter weight, empty body weight and carcass weight were not significant. The total separated fat content was significantly ( $p < 0.05$ ) higher in the carcass of kids born as twins. The meat bone ratio was lower in the kids born as single. Saleable meat yield was not affected by litter size (9.48 vs. 9.81 kg) and it was in the range of 91%. Both single and twin born kids were similar in depot fat distribution in carcasses and chemical composition of longissimus dorsi muscle. Single born kids showed non significantly higher myofibrillar and total protein

solubility, lower water holding capacity (27.13 vs. 29.90%) and higher cooking loss (37.30 vs. 36.94%) and lower pH than twin born kids (5.66 vs. 5.72). Meat from twin born kids showed significantly ( $p < 0.05$ ) lower shear force value indicating higher tenderness than single born kids (9.38 vs. 8.41 kg/cm<sup>2</sup>). The results indicated that Barbari kids born as single or twin had desirable carcass and meat qualitative characteristics.

**236.** Bharathy, N.; Veterinary College and Research Institute, Namakkal (India). Department of Livestock Production and Management. Ramesh, V.; Mecheri Sheep Research Station, Pottaneri (India). Saravana, Kuamr V. Ramesh; Mecheri Sheep Research Station, Pottaneri (India).Devendran, P.; Mecheri Sheep Research Station, Pottaneri (India).Sivakumar, K.; Mecheri Sheep Research Station, Pottaneri (India).. Growth Performance of Broiler Rabbits Under Different Systems of Housing. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 88-94 KEYWORDS: RABBITS. ANIMAL HOUSING. GROWTH RATE.

An experiment was conducted with 32 weaned rabbits, comprising 16 White Giant and 16 Soviet Chinchilla. The animals were divided into 4 groups consisting of eight animals in each group to find out the effect of different systems of housing on their growth. Among these, 2 groups were reared under modern raised platform shed while the other 2 groups under conventional tile roofed shed. The microclimatic variables and growth performance were recorded. Maximum and minimum temperature was found to be lower ( $p < 0.05$ ) and the light intensity both in the morning and evening was higher ( $p < 0.01$ ) in raised platform shed than in conventional tile roofed shed. No difference was observed in air velocity and relative humidity. Rabbits under raised platform shed had better feed conversion efficiency ( $3.10 \pm 0.20$ ) than the conventional tile roofed shed ( $3.42 \pm 0.31$ ) at 15th week of age. Among the breeds, White Giant had significantly ( $p < 0.05$ ) better feed conversion efficiency during the growing period. Though the housing system had no significant impact on body weight, the final weight at 15th week of age was higher in rabbits from modern raised platform shed than conventional tile roofed shed. Throughout the growing period Soviet Chinchilla rabbits showed significantly ( $p < 0.01$ ) more body weight than White Giant rabbits.

**237.** Kumar, Ravindra; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Singh C.V.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Effect of Genetic and Non - Genetic Factors on Growth and Wool Yield Traits in Chokla Sheep. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 95-98 KEYWORDS: SHEEP. WOOL. GROWTH RATE.

Effect of Genetic and Non - Genetic Factors on Growth and Wool Yield Traits in Chokla Sheep were studied.

**238.** Gupta, D.C.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Transfer of Technology and Social Sciences. Suresh, A.; National Centre for Agriculture Economics and Policy Research, New Delhi (India). Sethi, D.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Transfer of Technology and Social Sciences.. Economics of sheep and goat rearing in semi-arid region of Rajasthan. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 215-221 KEYWORDS: GOATS. ANIMAL HUSBANDRY. RAJASTHAN.

The study was undertaken with the objective of examining the cost and return of sheep and goat farming in semi-arid Rajasthan. Primary data were collected from 200 breeders spread over 12 villages from two tehsils of Ajmer district. The study indicated that the literacy rate of the head of the small ruminant breeder household was 40%. The average land holding size was 2.77 ha, with less than one-fifth of the area under irrigation. The average sheep and goat flock sizes were 52 and 16, respectively. The gross income from sheep farming was constituted by sale of animals (69.3%), manure (16.6%), milk (7.1%) and wool (7.0%). Whereas the major return to the goat breeder was from the milk (59.7%) followed by sale of animals (33.5%) and manure (6.8%). It was observed that if the expenditure of sheep rearing was calculated including imputed value of family labour and interest on fixed capital, then the expenditure on sheep rearing was more than returns. On the other hand, if the family labor cost and interest charged on fixed assets were ignored, the rearing cost per unit of sheep and goat would be around Rs. 260 and Rs. 344, respectively. The corresponding net return per sheep was Rs. 130 with the benefit-cost ratio of 1.5 and in goat it was Rs. 606 with benefit-cost ratio of 2.8, respectively. The net returns generally decreased with increase in size of holding, more visibly in case of sheep.

**239.** Tailor, S.P.; Bhilwara Maharana Pratap University of Agriculture and Technology, Udaipur (India). Krishi Vigyan Kendra. Yadav, C.M.; Bhilwara Maharana Pratap University of Agriculture and Technology, Udaipur (India). Krishi Vigyan Kendra.. Growth performance of pre- and post-weaning Sonadi lambs and adults in the native tract. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 221-224 KEYWORDS: LAMBS. GROWTH RATE. WEANING. RAJASTHAN.

Least-squares analysis of variance was employed to study the effect of district and sex on the measurements and body weight of Sonadi sheep from birth to adulthood. Data on body length, height at withers and heart girth were recorded on 6979 Sonadi sheep

maintained by 147 shepherds from eight tehsils in four districts. The overall least-squares mean for body weight at birth was  $2.05 \pm 0.59$  kg. The body length, height and girth at birth were  $32.86 \pm 0.84$ ,  $37.50 \pm 0.65$  and  $35.87 \pm 0.85$  cm, respectively. The height at birth was significantly ( $P < 0.01$ ) higher in lamb born in Udaipur, Chittorgarh and Rajsamand compared to Bhilwara district. Girth was significantly more for lambs born in Udaipur district compared to other districts. Body measurements at 3 months of age were significantly ( $P < 0.01$ ) affected by districts. The overall least-squares means for body length, height and girth at 6 months of age were  $55.50 \pm 0.54$ ,  $56.93 \pm 0.52$  and  $58.72 \pm 0.57$  cm respectively. Weight at 6 months was significantly ( $P < 0.01$ ) higher in lambs from Chittorgarh district compared to other districts. The effect of district on body measurements and weight at 9 months of age was significant ( $P < 0.01$ ). The overall least-squares means for body length, height, girth and weight at 9 months of age were  $59.11 \pm 0.60$ ,  $60.54 \pm 0.58$  and  $62.61 \pm 0.64$  cm and  $20.07 \pm 0.34$  kg, respectively. The district-wise means indicated that body conformation and weight at 15 months of age were significantly higher in Chittorgarh district compared to other districts. The overall means for body length, height, girth and weight at 18 months of age were  $64.61 \pm 0.68$ ,  $65.49 \pm 0.72$ ,  $70.74 \pm 0.77$  cm and  $28.48 \pm 0.69$  kg, respectively. The lambs of Chittorgarh district showed superiority in terms of body measurements and weight at 18 months of age compared to other districts. The study revealed better performance of Sonadi lambs and adults in terms of body conformation traits at all the stages of growth in Chittorgarh district.

## **L02 Animal feeding**

**240.** Panda, A.K.; Project Directorate on Poultry, Hyderabad (India) Lavanya, G.; Project Directorate on Poultry, Hyderabad (India) Reddy, E. Pradeep Kumar; Project Directorate on Poultry, Hyderabad (India) Rao, S.V. Rama; Project Directorate on Poultry, Hyderabad (India) Raju, M.V.L.N.; Project Directorate on Poultry, Hyderabad (India). Effect of Dietary Supplementation of Enzymes on Performance of Broiler Chickens in Maize-Soybean Meal based Diet. *Animal Nutrition and Feed Technology (India)*. (Sep 2012) v. 12(3) p. 297-303  
KEYWORDS: BROILER CHICKENS. SUPPLEMENTS. ENZYMES. FEED CONSUMPTION. FEED CONVERSION EFFICIENCY.

The present study was conducted to evaluate the effect of multi-carbohydrase enzymes (xylanase, glucanase, cellulase and mannanase) supplementation in maize-soybean meal based diet on the performance of broiler chickens. Control starter (0-3 wk) and finisher (4-6 wk) diet based on maize-soybean meal was formulated to meet respective nutrient requirement. Another low energy diet

was formulated in which the AME value was lowered by 100 kcal/kg. Three other experimental diets were formulated by adding 1x (low), 2x (medium) and 3x (high) concentration of enzymes per kg to the low energy diet. The content of enzymes in 1x concentration per kg diet was xylanase–3250 U, glucanase–1200 U, cellulase–900 U and mannanase 4000 U. Each diet was fed at random to 10 replicates of 6 chicks each throughout the experimental period. Supplementation of enzymes at the lowest concentration to the low energy diet resulted in higher weight gain at 3 wks, improved feed conversion ratio at both 3 and 6 weeks of age, and higher retention of nitrogen and energy and the values were similar to control group. No difference on performance could be noticed due to variation in the dose of enzymes indicating that lowest concentration of enzymes employed was adequate in eliciting the desired response. The carcass characteristics did not vary significantly amongst the dietary groups except the abdominal fat content. The abdominal fat content was significantly lower in the birds fed the low energy diet compared to either control or enzyme supplemented diets. Thus, it is concluded that AME can be reduced by 100 kcal/kg in maize- soybean meal based diet by supplementing carbohydrase enzyme.

**241.** Das, U. Mohan; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Faculty of Veterinary Science & Animal Husbandry. Swain, R.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Faculty of Veterinary Science & Animal Husbandry. Mishra, S.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Faculty of Veterinary Science & Animal Husbandry. Dehuri, P.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Faculty of Veterinary Science & Animal Husbandry. Dash, S.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Faculty of Veterinary Science & Animal Husbandry.. Effect of Supplementation of Concentrate on Growth Performance of Grazing Ganjam Goats in its Native Tract. Animal Nutrition and Feed Technology (India). (Sep 2012) v. 12(3) p. 335-342 KEYWORDS: GOATS. LAND RACES. CONCENTRATES. GROWTH RATE. GRAZING. DIGESTIBILITY.

In order to study the effect of supplementation of concentrates, 40 male kids were randomly divided into four equal groups and kept either on normal browsing (as per farmer's practice; (G1) alone or with additional supplementation of concentrate mixture at 50 (G2) 100 (G3) and 150 (G4) g per day per kid. During the experimental

period of 120 days, BW of kids was recorded fortnightly. Blood was collected at monthly interval. A digestibility trial was conducted at the end of experimental feeding period employing indicator method. Further, 27 top feed resources were identified in order to study the availability of top fodders to grazing Ganjam goats in the native tract. The average CP, EE, CF, NFE, total ash and Ca were observed to be 16.15±0.89, 5.59±0.34, 20.98±0.72, 48.68±1.25, 8.57±0.47 and 1.94±0.13 percent on DM basis, respectively. The ADG of the kids was 31.32±0.47, 41.45±0.38, 54.02±0.19 and 62.84±0.37 g in G1, G2, G3 and G4 respectively, with significant difference ( $P \leq 0.05$ ) among all the groups. Blood glucose and cholesterol levels were significantly ( $P \leq 0.05$ ) higher in G3 and G4 compared to G1 and G2; however, no differences ( $P > 0.05$ ) were observed in serum levels of total protein, albumin, urea and calcium. The digestibility of DM and other nutrients were significantly ( $P \leq 0.05$ ) higher in G4 compared to G1. It is concluded that, provision of 150g concentrate mixture significantly improved growth performance of Ganjam goats attributable to a more efficient utilization of the native pasture.

**242.** Sethy, Kamdev; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Dass, R.S.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Garg, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Bhadane, K.P.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Chaturvedi, V.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Effect of Dietary Cadmium on Growth, Nutrient Utilization and Immune Response in Kids. *Animal Nutrition and Feed Technology (India)*. (Sep 2012) v. 12(3) p. 353-362  
KEYWORDS: KIDS. CADMIUM. GROWTH. NUTRITION PHYSIOLOGY. IMMUNE RESPONSE.

Twenty four male kids (3-4 months, 9.1±0.03 kg BW) were divided into four groups of six animals in each and fed on a wheat straw based total mixed ration (TMR) added with cadmium as (cadmium chloride) at 0 (Cd0, control), 1.5 (Cd1.5), 3.0 (Cd3.0) and 4.5 (Cd4.5) ppm levels. Experimental feeding was done for a period of 126 days including a 6-day metabolism trial. To assess the growth performance, kids were weighed every seven days throughout the experimental period. After 90 days of experimental feeding, all the kids were intramuscularly inoculated with a single dose (2 ml) of *Pasteurella multocida* formalin inactivated antigen, and blood was collected on 0, 7, 14, 21 and 28 days of post vaccination to evaluate humoral immune response. Cell mediated immune (CMI) response of kids was assessed by in vivo delayed type hypersensitivity reaction

using phytohaemagglutinin-P as a mitogen. Results revealed that supplementation of Cd had no effect ( $P \geq 0.05$ ) on intake and digestibility of dry matter, organic matter, crude protein, ether extract, neutral detergent fiber, acid detergent fiber and hemicellulose; and balances of phosphorus, zinc, iron and copper. However, Cd supplementation had an adverse effect on calcium balance and also increased ( $P \leq 0.05$ ) the retention of Cd. Average daily gain was significantly ( $P \leq 0.05$ ) reduced in group Cd4.5 (28.76 g); however, growth performance in group Cd1.5 (37.46 g) and Cd3.0 (39.12 g) was comparable to control (Cd0) group (41.60 g). Humoral immune response and CMI response were significantly ( $P \leq 0.05$ ) reduced in all the Cd supplemented groups as compared to control group. These results indicated that while growth rate was adversely affected at 4.5 ppm level of Cd supplementation, immune response was hampered even at as low as 1.5 ppm level of Cd supplementation in goat kids.

**243.** Tayo, Tilling; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Dutta, Narayan; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Sharma, K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Pattanaik, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Singh, A.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Narang, A.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Kumar Arvind; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Effect of Feeding Canola Quality Meal on the Performance of Lactating Cows. *Animal Nutrition and Feed Technology* (India). (Sep 2012) v. 12(3) p. 373-381 KEYWORDS: COWS. LACTATION. MILK YIELD. RAPESEED MEAL.

The study was carried out to ascertain the effect of feeding canola quality RMC on the lactation performance of 18 crossbred lactating cows. The cows were randomly divided into three treatments 6 each in a completely randomized design and allocated in 3 dietary supplements viz. soybean meal (SBM), rapeseed mustard cake (RMC) and canola quality meal (CQM) containing soybean meal, rapeseed mustard cake and canola quality rapeseed mustard meal, respectively as a major protein source for a period of 90 days. The glucosinolates (GLS) content of RMC and CQM were 38.12 and  $3.91 \mu\text{mol g}^{-1}\text{DM}$ , respectively. The daily intake of DM, OM and green fodder by lactating cows did not differ significantly ( $P \geq 0.05$ ) irrespective of the dietary treatments. However, concentrate intake

(kg d<sup>-1</sup>) was linearly ( $P \leq 0.04$ ) lower in the animals given RMC concentrate as compared to their counterparts either fed SBM or CQM based concentrates. The digestibility coefficient (%) of DM, OM, CP, EE, NDF and ADF; and the nutrient intake (g/kgW<sup>0.75</sup>) and density (%) of composite diets in terms of DCP and TDN did not differ significantly ( $P \geq 0.05$ ) irrespective of dietary treatments. The GLS intake ( $\mu\text{mol d}^{-1}$  or  $\mu\text{mol g kg}^{-1}\text{W}^{0.75}$ ) by cows was linearly ( $P \leq 0.001$ ) higher in RMC as compared to CQM group. Feeding of RMC based supplement to cows resulted in decreased ( $P \leq 0.03$ ) daily milk yield, 4% FCM (kg d<sup>-1</sup>), fat and protein yield (g d<sup>-1</sup>) and total milk production (kg), as compared to CQM fed cows, however, SBM group had an intermediate position in respect to target parameters in between RMC and CQM groups. The efficiency of milk production was quadratically better ( $P \leq 0.07$ ) in CQM group followed by cows given SBM and RMC without any significant effect ( $P \geq 0.05$ ) on milk composition irrespective of dietary treatments. It may be concluded that soybean meal can be replaced completely by canola quality rapeseed-mustard meal without compromising the lactation performance of crossbred cows.

**244.** Kumar, A.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Bhar, R.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Mandal, A.B.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Ojha, B.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Baliyan, S.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Shrivastava, S.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition Goswami, T.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Effect of Feeding Lysine Supplemented Low Protein Diet on Growth Performance, Nutrient Utilization and Immunity in Growing Landrace Crossbred Pigs. *Animal Nutrition and Feed Technology* (India). (Sep 2012) v. 12(3) p. 383-393 KEYWORDS: SWINE. PROTEIN RESTRICTED DIETS. SUPPLEMENTS. LYSINE. GROWTH RATE. NUTRITION PHYSIOLOGY. IMMUNITY.

A total of 21 (9 male and 12 female) landrace crossbred weaned piglets ( $11.72 \pm 0.57$  kg BW;  $7.59 \pm 0.14$  weeks of age) were randomly assigned to three dietary groups (SPSL, LPSL and LPLL), of seven each to study the effect of feeding a low protein (LP) diet supplemented with lysine on growth performance, nutrient utilization and immunity. A basal diet formulated as per NRC requirements served as control (SPSL). The CP content of the SPSL diet was reduced by

10%, and fed with supplemental lysine (as L-lysine HCl) at 100 (LPSL) and 85 (LPLL) percent levels in the two treatment groups. All the diets were iso-caloric and offered for 126 days in phases according to the body weight (10-20, 2050, 50-80 and 80kg). A metabolism trial of 6 days duration was conducted after 45 days of experimental feeding to assess the digestibility of nutrients, nitrogen balance and plane of nutrition. Immunological studies (humoral through microhemagglutination assay against sheep-red blood cells, and cellular immunity through delayed type hypersensitivity reaction to intradermal PHA-P inoculation) along with different blood parameters were estimated in last month of the experiment. The body weight gain, feed intake and feed conversion efficiency did not differ ( $P < 0.05$ ) among the treatment groups. The intake and digestibility of different proximate nutrients also did not differ. Immunological and certain blood biochemical parameters were also comparable among the different group. It was concluded that the dietary protein and lysine supply can be reduced by 10 and 15%, respectively, compared to NRC recommendation without any compromise on performance, nutrient utilization and immunity in landrace crossbred growing pigs.

**245.** Kushwaha, Raju; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division. Rai, S.N.; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division. Singh, A.K.; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division.. Influence of Feeding Acacia Nilotica Pods on Intake, Nutrient Utilization and Immune Status in Pregnant Goats. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 8-14  
KEYWORDS: ACACIA NILOTICA. FRUIT. FEED INTAKE. NUTRITION PHYSIOLOGY. IMMUNITY. GOATS.

Twenty one first time pregnant crossbred goats (Alpine x Beetal) of similar age and body weights were divided in to three groups of seven each and fed on three different diets in the ratio of 50:50 concentrate: roughage. Babul (*Acacia nilotica*) pods (pulp+seeds) were incorporated 0, 33 and 50 % in concentrate mixture, to make the diets equivalent to tannin concentrations of 0, 3 and 4.5 % in the total mixed ration (TMR) of I, II and III respectively. Native babul pods were supplemented in TMR II while in TMR III, it was pre-treated with 3 % Ca (OH)<sub>2</sub> before supplementation. Body weights of the animals and intake of DM, C P, EE, C F, NFE, NDF and ADF remained similar amongst different treatments. Digestibility of dry matter and organic matter were however, higher ( $P < 0.05$ ) in TMR II than TMR I or TMR III, while digestibility of ether extract was higher ( $P < 0.01$ ) in both TMR II and TMR III than control. The concentration of plasma minerals such as Cu, Fe, Mn and Zn remained similar amongst the dietary groups. There was no significant change in plasma

antioxidant activity and plasma total immunoglobulin levels between the groups. There was also no effect on the plasma retinol and  $\alpha$ -tocopherol concentrations during pregnancy under different dietary groups. It is concluded that *Acacia nilotica* pods could be safely incorporated up to 3% tannin equivalent i.e.33% in the concentrates mixture of pregnant goats without affecting intake and nutrient utilization. However, at higher levels at 4.5% tannins equivalent i.e. 50% in the concentrate may require calcium hydroxide treatment (3%w/w) before use.

**246.** Thirumalesh, T.; College of Agriculture, Bijapur (India) Department of Animal Science.Ramesh, B.K.; Krishi Vigyana Kendra, Bellary (India)Suresh, B.N.; Krishi Vigyana Kendra, Bijapur (India). Influence of Season on Nutrient Intake and Performance of Broilers in Arid Region of Karnataka. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 78-81 KEYWORDS: BROILER CHICKENS. NUTRIENT INTAKE. SEASONS. ARID ZONES. KARNATAKA.

Three batches of 150 broilers each were reared on deep litter under different seasons viz summer, rainy and winter. All the birds in three seasons were fed adlibitum with commercial feed comprising 20.32% CP and 2700 Kcal/Kg ME in broiler starter (0–3 wks) and 17.42 % CP and 2800 Kcal/Kg ME in broiler finisher (4–7 wks) diet. There was no significant difference observed between the seasons in feed intake, watering take, FCR, weight gain, nutrient intake, mortality and dressing percentage where as statistical difference was observed in humidity and temperature between the seasons. High feed intake, nutrient intake and weight gain were observed in first two weeks of the birds in winter season and same trend was observed in rainy season from third week onwards. High mortality and dressing percentage were noticed in rainy season when compared to summer and winter seasons. The numerical differences in all the seasons pertaining to nutrients intake and performance of birds indicated that rainy season is optimum season for making broiler unit viable and profitable in arid regions of Karnataka.

**247.** Devi, J.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India).Faculty of Veterinary Science & Animal Husbandry.Goswami, J.; Assam Agricultural University, Guwahati (India). College of Veterinary Science.Sarmah, B. C.; Assam Agricultural University, Guwahati (India). College of Veterinary Science.Sarma, Kamal; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India).Faculty of Veterinary Science & Animal Husbandry.. Effect of Zinc Supplementation on Growth Rate of Assam Local Male Kids. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 95-97 KEYWORDS: GOATS. SUPPLEMENTS. ZINC. TRACE ELEMENTS. GROWTH RATE.

An experiment was conducted on thirty six Assam local male kids of three months of age and between 3 to 4 kg of body weight. The animals were divided into group I (control group, (n=12) in which kids were grown without zinc supplementation), group II (Inorganic group, (n=12) in which kids were grown with inorganic zinc supplementation, zinc sulphate) and group III (Organic group, (n=12) in which kids were grown with organic zinc supplementation, zinc propionate). All the experimental goats received concentrate mixture 50 g/day/goat up to 5 months and then 100 g/day/goat up to 7 months of age in addition to their free range grazing. The present study revealed gradual increase of body weight with advancing age in all the groups' kids as measured at fortnightly interval from 5 to 7 months of age. The body weight of the organic zinc-supplemented kids was highest as compared to inorganic zinc-fed group. Lowest growth rate observed in kids of control group. The ranged values (Mean  $\pm$  S.E.) were recorded as 5.08 $\pm$ 0.07 to 7.93 $\pm$ 0.07 kg in control, 5.31 $\pm$ 0.10 to 8.33 $\pm$ 0.04 kg in inorganic and 5.25 $\pm$ 0.09 to 9.75 $\pm$ 0.14 kg in organic zinc-fed groups of kids. From the study, it can be concluded that the organic zinc source proved better choice than inorganic one as feed supplement considering bioavailability and effectiveness.

**248.** Mudgal, Vishal; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Baghel, R.P.S.; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Ganie, Ajaz; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Srivastava Shalini; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India). College of Veterinary Science and Animal Husbandry.. Effect of Feeding Bypass Fat on Intake and Production Performance of Lactating Crossbred Cows. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 103-104 KEYWORDS: COWS. DRY MATTER CONTENT. NUTRIENT INTAKE. LACTATION.

Bypass fat is the major concern now a days in the feeding of high producing cross bred cows, on this aspect an experiment was conducted on 12 cross bred cows (milk production 6.52  $\pm$  1.15 lits) in late lactation (150  $\pm$  10 days in lactation) and their effect on dry matter intake and milk production was evaluated. Crossbred cows were divided into two groups of six each on the basis of their production and control group was fed basal diet of concentrate mixture and ad-libitum wheat straw, while the treatment group was supplemented with 200g berga fat/head/day in addition to same basal diet. It was observed that feeding of by pass fat had no effect on dry matter intake and milk yield of the crossbred cows. Thus, it may be concluded that in late lactation when the milk yield remains

on declining trend, no effect on yield was observed by berga fat supplementation.

**249.** Singh, S.P.; National Dairy Research Institute, Karnal (India) Hooda, O.K.; National Dairy Research Institute, Karnal (India). Parveen Kumar; National Dairy Research Institute, Karnal (India). Effect of yeast supplementation on feed intake and thermal stress mitigation in buffaloes. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 961-964 KEYWORDS: WATER BUFFALOES. SUPPLEMENTS. YEASTS. FEED INTAKE. HEAT STRESS.

Murrah buffaloes (18) divided into 3 groups of 6 animals each. Group 1 served as control, group 2 exposed to heat stress, group 3 exposed to heat stress and supplemented with yeast powder. The animals of heat exposed groups (group 2 and group 3) were kept at 40 °C for 4 h daily for 16 days. During the period of heat exposure animal's physiological responses were recorded at every fourth day. Dry matter intake recording and supplementation of yeast started 21 days before heat exposure. Feed intake recording was done daily. Supplementation of yeast resulted into significant increase in DMI of group 3 before thermal exposure and thereafter dropped marginally during heat exposure. DMI decreased significantly in group 2 due to heat stress. Physiological responses (RR, PR and RT) did not differ significantly in all the 3 groups before exposure to thermal stress. On exposing the animals at 40°C, RR, PR and RT increased significantly in all the 3 groups compared to beginning of the exposure. RR, PR and RT were significantly higher in groups 2 and 3 compared to group 1. In group 3, RR and PR dropped significantly and RT nonsignificantly compared to group 2, however, the values of all these parameters remained significantly higher compared to group 1. The results indicated that supplementation of yeast prevented decrease in DMI but RR and PR decreased significantly and RT nonsignificantly.

**250.** Das, M.M.; Indian Grassland and Fodder Research Institute, Jhanshi (India). Singh, K.K.; Indian Grassland and Fodder Research Institute, Jhanshi (India).. Effect of exogenous fibrolytic enzyme supplementation or treatment of wheat straw on nutrient utilization and milk yield in crossbred cows. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 965-967 KEYWORDS: COWS. CROSSBREDS. ENZYMES. SUPPLEMENTS. NUTRITION PHYSIOLOGY. MILK YIELD.

The study was undertaken to study the effect of fibrolytic enzyme supplementation or treatment of wheat straw on nutrient utilization and milk yield in crossbred cows. Crossbred lactating cows (15; average body weight, 13.50 kg) were randomly divided in to 3 groups of 5 each. The animals of control group (T1) were fed untreated wheat straw, sorghum stover and concentrate as per requirement,

whereas the animals of T2 and T3 were fed exogenous fibrolytic enzymes supplemented and treated wheat straw with fibrolytic enzyme, sorghum stover and concentrate mixture for a period of 90 days. At the end, a digestibility trial of 7-day collection was conducted. The dry matter intake was 8.69, 9.61 and 9.88 kg/day/animal, respectively, in T1, T2 and T3. DMI as per centbody weight was relatively higher in T2 and T3 than T1, though values were not statistically significant. Digestibility coefficient of DM and OM were comparable among the groups; however, digestibility of NDF and ADF was significantly higher in T2 and T3 than T1. DCP intake by the cows in different groups was similar, however, TDN intake (kg/day/animal) was comparatively higher in T2 (5.40) and T3 (5.59) than T1 (4.79). Milk yield and its composition were comparable among the groups. It can be concluded that fiber digestibility was improved by fibrolytic enzyme supplementation or feeding of wheat straw treated with fibrolytic enzymes, however, milk yield and its composition was unaffected in crossbred cows.

**251.** Walkunde, T.R.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Fulpagare, Y.G.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India).. Effect of whole linseed based ration on fatty acids profile of meat of osmanabadi kids. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 131-136 KEYWORDS: KIDS. OILSEEDCAKES. LINSEED. RATIONS. OILS. FATTY ACIDS. INDIA.

Changes in composition and fatty acids profile, specifically Omega 3, Omega 6 and its isomers in meat of kids as affected by dietary supplementation of whole linseed were investigated. Twenty four weaned Osmanabadi kids were, divided in four groups of six each. Group T0 was fed concentrate mixture as per requirement, however, 50, 100 and 150 g concentrate mixture provided to groups T1, T2, and T3 was replaced by whole linseed, respectively during the feeding trial for a period of 3 months. Content of  $\omega$ -3 in 100 g meat was 25.22, 99.75, 159.55 and 215.06 mg in groups T0, T1, T2, and T3, respectively, while  $\omega$ -6 content in corresponding groups was 103.94, 150.86, 204.60 and 288.47 mg/100 g meat. The  $\omega$ -3 and  $\omega$ -6 contents in meat were increased significantly on increasing the quantity of linseed in the ration. As a result of increased linseed supplementation, levels of the minor  $\omega$ -3 fatty acid isomers and total poly unsaturated fatty acids were also enhanced while total saturated fatty acids reduced significantly. It can be concluded that linseed supplementation can alter the fatty acids profile of kid's meat.

**252.** Malik, P.K.; N. M. College of Agriculture Navsari Agricultural University, Navsari (India). Arvadia, M.K.; N. M. College of Agriculture Navsari Agricultural University, Navsari (India). Deshpande, S.B.; N.

M. College of Agriculture Navsari Agricultural University, Navsari (India). Fulsunder, A.B.; N. M. College of Agriculture Navsari Agricultural University, Navsari (India). Tyagi, K.K.; N. M. College of Agriculture Navsari Agricultural University, Navsari (India). Siddique, R.A.; N. M. College of Agriculture Navsari Agricultural University, Navsari (India).. Effect of nitrogen and cutting management on production potential and quality parameters of kanchru (*Apluda aristata*) fodder. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 137-143 KEYWORDS: FORAGE.

Experiments were conducted during the kharif season for three years (2007–2009) to ascertain the effect of different treatment combinations having four N levels and two cutting management system on green and dry fodder yield as well as quality parameters of the Kanchru (*Apluda aristata*) fodder. N was applied at the rate of 0 (No), 40 (N1), 80 (N2) and 120 (N3) kg/ha, however, fodder was cut twice (at 45 and 90 days after sowing under C1 cutting management system) and thrice (at 45, 75 and 105 days after sowing under C2 cutting management system). The highest and lowest green fodder yield was recorded for N 3 and N0, respectively and green fodder yield for N1 and N2 varied in between these two. Green fodder yield increased by 14, 24 and 50 per cent on the application of N at 40, 80 and 120 kg/ha- over the 0 N level. The green fodder yield was significantly (P0.05) higher under C2 than that for C 1 cutting management system, irrespective of the years and in pooled analysis too. Similar trend was recorded for dry fodder production, which was significantly (P0.05) higher, irrespective of the years, on the application of N 120 kg/per ha over 0 N application. The interaction of N and cutting management also revealed significant (P0.05) interaction for both green and dry fodder yield in individual year as well as in pooled analysis except in 2009, which was non significant. The difference in the net realization on N application with zero and 120 kg levels under both the cutting management system was Rs. 17,046 and Rs. 34, 840, respectively for C1 and C2. The in vitro gas production decreased significantly (P0.05) in the third cut as compared to first cut under C2 system, however, the difference between first and second cut was not significant. The IVDMD of fodder in the third cut under C2 system was lower (P0.05) than that in first cut. The variation in IVDMD between other cuts was not significant. It may be concluded that Kanchru (*Apluda aristata*) fodder should be cultivated with an application of 120 kg N and harvested at 45, 75 and 105 days after sowing to get maximum productivity. Kanchru fodder may be fed to the animals for sustaining their maintenance and low productive requirements.

**253.** Jha, Pankaj; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Sehgal, J.P.; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Lather, Puja; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Sharma, Vijay Kumar; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Jha, Nisha; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division.. Effects of supplementation of wheat straw based complete feed blocks with fungal zoospores and sulphur on rumen fermentation in buffalo calves. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 144-148 KEYWORDS: WATER BUFFALOES. CALVES. RUMEN DIGESTION. WHEAT STRAW. COMPLETE FEEDS.

Eighteen Murrah buffalo calves of similar age and body weight were divided into three groups of six each and fed on a complete feed blocks (concentrate mixture 50%, wheat straw 43%, molasses 6% and urea 1%) along with 2 kg green oats in group 1 while feed block of group 2 was supplemented with purified fungal zoospores of *Neocallimastix* spp. GR-1 (group 2) and group 3 feed blocks provided to group 2, 1% wheat straw was replaced (w/w) by sodium sulphate. Experimental feeding continued for a period of 120 days after which rumen liquor samples were collected for three consecutive days by using a stomach tube from all the calves before feeding. Concentration of TVFA's, Total-N and TCA-precipitable N in SRL was significantly higher (P<0.05) while that of ammonia N was lower (P<0.05) in group 3 than in other groups. The total no of zoospores and bacteria/ml SRL were significantly higher and total number of protozoa/ml SRL was lower in sulphur supplemented group as compared to other groups.

**254.** Singh, Neelam; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Rahal, Anshu; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Mondal, B.C.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India).. Effect of feeding different mineral mixtures on feed intake and nutrient utilization in local goats. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 153-156 KEYWORDS: GOATS. MINERAL NUTRIENTS. FEED INTAKE. NUTRITION PHYSIOLOGY. NUTRIENTS.

Twenty non-descript goats were divided into four groups of five each and fed on basal ration as well as that supplemented with selective mineral mixture, mineramin and minfa 2% of concentrate mixture, respectively. DM and TDN intake were highest in Minfa supplemented group and variation among groups was significant. Significant (P<0.05) differences were also noted for DM, OM and NFE digestibility among the groups. It was concluded that Minfa was best

among the tested mineral mixtures.

**255.** Datt, Chander; Acharya N.G. Ranga Agricultural University, Hyderabad (India). College of Veterinary Sciences, Department of Veterinary Biochemistry.Reddy, G.V.N.; Acharya N.G. Ranga Agricultural University, Hyderabad (India). College of Veterinary Sciences, Department of Veterinary Biochemistry.Kundu, S.S.; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division.. Effect of feeding differently processed paddy straw based complete diets on feed intake and nutrient utilization in Nellore rams. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 160-165 KEYWORDS: SHEEP. LAND RACES. STRAW. FEED PROCESSING. FEED INTAKE. NUTRITION PHYSIOLOGY. ANDHRA PRADESH.

The effect of processing methods on feed intake and nutrient utilization was studied in twenty adult (18–24 months) Nellore rams, divided into 4 groups of 5 each. The animals in control group (T1) were given chaffed (3–4 cm) paddy straw and concentrate mixture separately; while those in group 2 (T2), complete rations in mash form; in group 3 (T3), the same diet as in T2 but also supplemented with dried yeast culture (*Saccharomyces cerevisiae*; NCL 3190) at 0.1% level and in group 4 (T4), the mash form (T2) was subjected to expander-extruder processing. Rumen liquor profile indicated significantly (P<0.01) higher concentration of total N, TCA precipitable N, NH<sub>3</sub>-N and TVFA in groups T2, T3 and T 4 than in control group (T1) but differences among T2, T3 and T 4 were not significant. Blending of paddy straw into complete diets significantly increased DM intake, digestibility of protein, N balance as well as DCP and TDN intakes compared to control diet, however, supplementation of *S. cerevisiae* or expansion-extrusion processing of mash did not result in further improvement in feed intake and nutrient utilization as compared to mash diet per se.

**256.** Ikhar, U.V.; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India) College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition.Singh, S.K.; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India) College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition.Mudgal, Vishal; M.P. Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur (India) College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition.. Effect of different feeding regimen on growth and reproductive performance of sahiwal heifers. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 181-184 KEYWORDS: HEIFERS. DRY MATTER CONTENT. FEEDS. GROWTH RATE. REPRODUCTIVE PERFORMANCE.

To study the effect of different feeding regimen on growth and reproductive performance of Sahiwal heifers, eighteen Sahiwal heifers (2.5–3 years,  $170.55 \pm 19.02$  kg b. wt.) were randomly divided into three groups. Heifers in control (T1) group were fed concentrate mixture as per their nutritional requirements along with wheat straw ad libitum, whereas those in groups T2 and T3 were fed same diet except that the supply of DCP and TDN were only 80 and 70% of requirements recommended by ICAR (1998), respectively. Reduced level of dietary DCP and TDN did not affect DM intake. The daily weight gain was significantly lower ( $P < 0.05$ ) in group T3 whereas the reduction was not significant in group T2 ( $P < 0.05$ ) in comparison of control group. Nutrient digestibility was higher ( $P < 0.05$ ) and fertility responses as percentages of estrous as well as conception rate were slightly higher in heifers of group T2 than those in other groups. However, due to less number of observations, conclusion could not be drawn. The effect of different feeding regime on economics of growth revealed that the 80% level was comparable to that of control group, while the 70% level was a costlier means of heifer rearing. Hence, It is concluded that 20% reduction in the level of DCP and TDN as compared to ICAR recommendation did not affect DM intake, growth, nutrient utilization, and economics of heifer rearing adversely.

**257.** Mondal, G.; Sher-e-Kashmir University of Agricultural Science and Technology, Kargil (India). Regional Agricultural Research Sub-Station. Kakati, B. K.; Sher-e-Kashmir University of Agricultural Science and Technology, Kargil (India). Regional Agricultural Research Sub-Station. Mehdi, Mohd.; Sher-e-Kashmir University of Agricultural Science and Technology, Kargil (India). Regional Agricultural Research Sub-Station.. Performance of broiler chicks under kargil conditions. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 207-211 KEYWORDS: BROILER CHICKENS. CHICKS. CHICKENS. ANIMAL PERFORMANCE. JAMMU AND KASHMIR.

The performance of commercial broiler with replacement of maize and fishmeal with wheat, barley and detoxified apricot oil cake in the finisher ration was studied under Kargil condition. 120 birds (day old) divided into 2 groups (60 each,  $15 \times 4$  replicates), each group fed same starter ration up to 4th week of age and finisher ration with maize and fishmeal to the group I and replacing the feeds with locally available feeds in group II upto 8th weeks of age. Blood parameters viz., glucose, hemoglobin, total erythrocyte count (TEC), packed cell volume (PCV), total leukocyte count (TLC) and different leukocyte count (DLC) were statistically similar in both the groups. Weight gain, feed conversion ratio (FCR) in group I was 1590.28 g and 2.31, respectively whereas in group II, respective values were 1482.57 g and 2.34, respectively. Mortality percent (6.60 vs. 8.30 in

group I and II), dressing percent (72.64 vs. 71.57 in group I and II) and other slaughter traits viz., blood loss, feather loss, leg, breast, back and neck weight and various organ's weight were statistically similar in both the groups. It was concluded from the present experiment that locally available feeds i.e., wheat, barley and detoxified apricot oilcake may be used safely in the finisher ration for optimum growth, without affecting carcass quality under Kargil conditions.

**258.** Barman, Keshab; National Research Centre on Pig, Guwahati (India). Banik, S.; National Research Centre on Pig, Guwahati (India). Das, H.K.; National Research Centre on Pig, Guwahati (India). Das A.; National Research Centre on Pig, Guwahati (India).. Effect of fish meal supplementation on feeding economy of meghalaya local grower Pigs. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 222-224 KEYWORDS: SWINE. FISH MEAL. SUPPLEMENTARY FEEDING. SUPPLEMENTS. MEGHALAYA. ANIMAL FEEDING.

Twelve Meghalaya local pigs (2 months,  $7.21 \pm 0.90$  kg b.wt.) of either sex, divided into two groups of 6 in each in a randomized block design, were fed on two types of grower rations containing 0 (T0) and 3% (T1) fish meal. The pigs were fed on the experimental grower rations twice daily. CP content in diets T0 and T1 was  $17.60 \pm 0.25$  and  $17.51 \pm 0.43\%$ , and energy content (Kcal ME/kg) was 2914 and 2932, respectively. Average DM intake ( $346.67$ g/d) was similar in both groups. Digestibility of nutrients except that of CF was higher ( $P < 0.05$ ;  $P < 0.01$ ) in group T1 than in group T0. The average body weight gain (g/day) in groups T1 ( $90.44 \pm 9.52$ ) was, significantly higher ( $P < 0.05$ ) than in group T0 ( $81.68 \pm 10.07$ ). The feed conversion efficiency was also higher ( $P < 0.05$ ) in group T1 ( $3.17 \pm 0.68$ ) than in group T0 ( $4.03 \pm 0.46$ ). The cost of production per kg live weight (Rs.) in group T1 ( $Rs. 53.34 \pm 11.38$ ), was significantly lower ( $p < 0.05$ ) in group T0 ( $Rs. 67.54 \pm 7.73$ ). It was concluded that cost of feeding can be reduced by supplementation of fish meal in grower swine ration.

**259.** Reddy, P.V.M.; Sri Venkateswara Veterinary University, Hyderabad (India). Livestock Research Institute, College of Veterinary Science. Reddy, K. Kondal; Sri Venkateswara Veterinary University, Hyderabad (India). Livestock Research Institute, College of Veterinary Science. Kumar, M. Shashi; Sri Venkateswara Veterinary University, Hyderabad (India). Livestock Research Institute, College of Veterinary Science. Harikrishna, Ch.; Sri Venkateswara Veterinary University, Hyderabad (India). Livestock Research Institute, College of Veterinary Science. Raghunandan, T.; Sri Venkateswara Veterinary University, Hyderabad (India). Livestock Research Institute, College of Veterinary Science.. Effect of Feeding *Pediococcus Acidilactici* and *Saccharomyces Boulardii* As Probiotics in Lambs. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 53-58 KEYWORDS:

LAMBS. PROBIOTICS. PEDIOCOCCUS ACIDILACTICI. PEDIOCOCCUS. SACCHAROMYCES.

The present study was carried out on 18 lambs of either sex of Decanni breed, each weighing 7.0 kg to study the effect of feeding *Pediococcus acidilactici* and *Saccharomyces boulardii* on growth performance, serum cholesterol, serum triglycerides, serum calcium, faecal coliforms and immunity response for a period of ten weeks. The experiment comprised of three groups supplemented with *Pediococcus acidilactici* (PA) as the first group, *Saccharomyces boulardii* (SB) as the second group and control (C) as the third group. The results indicated that there was no significant difference in the serum parameters but a significant ( $p < 0.01$ ) body weight gain was recorded in both the probiotic supplemented groups (PA and SB). The coliform counts in faeces were significantly decreased in lambs fed with probiotics (PA and SB) compared to the control group but no significant difference of hemagglutination (HI) titers against Brucellosis vaccine was observed in all the experimental groups.

**260.** Reddy, Y. Ravindra; Livestock Research Station, Palamaner (India). Rao, K. Sarjan; Livestock Research Station, Palamaner. Sudhakar, K.; Livestock Research Station, Palamaner. Gupta, D. Ramesh; Livestock Research Station, Palamaner. Prakash, M. Gnana; Livestock Research Station, Palamaner. Nutrient Utilization of Azolla and Sheanut Cake in Nellore Sheep Under Different Management Systems. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 59-63 KEYWORDS: SHEEP. AZOLLA PINNATA. PROXIMATE COMPOSITION. DIGESTIBILITY. NUTRITION PHYSIOLOGY. GROWTH RATE.

Four isonitrogenous diets were formulated using Azolla (*Azolla pinnata*) as low protein supplement and Sheanut cake (*Vitellaria paradoxa*) as energy supplement in a 4x6 completely randomized design in Nellore adult sheep under intensive and semi intensive systems of management. The sheep were fed control ration (T1), concentrate diet with replacement of 30 parts of GNC with Azolla (T2), concentrate diet replacement of 16 parts of Ricebran with Sheanut cake (T3) and concentrate diet containing replacement of 30 parts of GNC with Azolla and 16 parts of Ricebran with Sheanut cake (T4). Significantly ( $P < 0.05$ ) higher dry matter intake (kg) per day was recorded for experimental concentrate mixtures T2 and T3 compared to T4 in both the system of management. The dry matter intake/100 kg body weight was significantly ( $P < 0.01$ ) higher in semi intensive system than intensive system. Significantly ( $p < 0.01$ ) higher digestibility coefficient (%) were recorded for DM, OM, CP, EE, NFE, NDF, ADF, hemicellulose and cellulose for T4 than other concentrate mixtures and control diet in intensive system, whereas the similar trend were also observed for digestibility coefficients (%) of all

nutrients except NFE in semi intensive system. Significantly (P0.01) higher digestibility coefficients (%) were recorded for DM, OM, CP, NFE, hemicellulose and cellulose in intensive system whereas CF digestibility was significantly (P0.01) higher in semi intensive system.

### **L10 Animal genetics and breeding**

**261.** Lal, S.V.; Jawahar Lal Nehru Krishi Vishwavidhyalaya, Jabalpur (India). Biotechnology Centre. Singh, S.; Jawahar Lal Nehru Krishi Vishwavidhyalaya, Jabalpur (India). Biotechnology Centre. Kumari, R.; Central Sheep and Wool Research Institute, Avikanagar (India). Animal Biotechnology Section. Kumar, S.; B.A.U., Patna (India). Dept. of Animal Nutrition.. Molecular and Epigenetic Study of H19 Gene in Goat (*Capra Hircus*). Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 15-21 KEYWORDS: GOATS. MOLECULAR GENETICS. ANIMAL BIOTECHNOLOGY.

Due to the high incidence of abnormalities and the inefficiency of generating goat kids through somatic cell nuclear transfer (SCNT), the development of a model system in goat to investigate potential problems is warranted. In nuclear transfer, where genomic imprinting has been implicated as a major cause for these problems, epigenetic regulation of developmentally important genes may give us the clue regarding the probable reasons for the low efficiency observed in SCNT. H19 is one such paternally imprinted gene. The present investigation was undertaken to study the methylation status of CTCF III binding region in the upstream of H19 gene before and after reprogramming by serum starvation method, in cultured fibroblast cells. Fibroblast cells were cultured up to sixth passage and genomic DNA was extracted before and after reprogramming. Genomic DNA samples were then used to amplify 295 bp fragment of H19 CTCF III binding region. The nucleotide sequence identified in this fragment had 19 CpG motifs. Genomic DNA samples were then treated with sodium bisulphite to analyse the methylation status of identified CpG motifs. The bisulphite converted genomic DNA was amplified by bisulphite sequencing primer (BSP) set. The amplified fragments of bisulphite converted genomic DNA samples of reprogrammed and non-reprogrammed cells were then sequenced. Variation in the sequences were obtained from bisulphite converted genomic DNA of reprogrammed and non-reprogrammed cells. The nucleotide sequence analysis of bisulphite converted cultured non-reprogrammed cells revealed methylation of 6 CpG motifs. The level of methylation observed in the study for 295 bp gene fragment was about 31.5%. However, in reprogrammed cells the CpG motifs were found to be unmethylated. Therefore, it is concluded that a reduction in the level of methylation was observed in reprogrammed fibroblast cells after serum starvation.

**262.** Reddy, S. Sai; Sri Venkateswara Veterinary University, Hyderabad (India). Gupta, B. R.; Sri Venkateswara Veterinary University, Hyderabad (India). Vinoo, R.; Sri Venkateswara Veterinary University, Hyderabad (India). Sudhakar, K.; Sri Venkateswara Veterinary University, Hyderabad (India). Mahender, M.; Sri Venkateswara Veterinary University, Hyderabad (India).. Factors Affecting Life Time Production Traits of Ongole Cattle. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 43-39 KEYWORDS: CATTLE. LAND RACES. ANIMAL PRODUCTION. HERITABILITY. GENETIC CORRELATION.

The data on Ongole 283 cows maintained at four farms, spread over a period of 18 years from 1985 to 2001 were analyzed. The overall least squares means for life time milk yield, herd life, productive life, milk yield per day of herd life and productive life; wet days and dry days per herd life; wet days and dry days per productive life and gestation period per herd life and productive life were 3805.88 kg, 3773.84 days, 2287.48 days, 1.00 and 1.67 kg; 32.15% and 67.85%; 53.58% and 46.41% and 39.46% and 66.54%, respectively. The effect of farm was significant on all the life time traits studied except wet days per herd life and productive life percentages. Period of birth significantly influenced all the life time production traits studied except life time milk yield and productive life. Significant influence of season of birth was observed on life time milk yield, milk yield per day of herd life and milk yield per day of productive life, while set of the bulls had no significant influence on any of the life time production traits studied. The life time performance of the animals of Lam farm was superior, followed by those of Chadalawada, Mahanandi and Chintaladevi farms. The heritabilities of life time production traits ranged from low to high. The genetic and phenotypic correlations between productive traits were positive while the traits related with dry period and gestation period showed negative Association with the traits under study.

**263.** Thomas, Naicy; College of Veterinary and Animal Sciences, Mannuthy (India). Centre for Advanced Studies in Animal Genetics and Breeding. Anilkumar, K.; College of Veterinary and Animal Sciences, Mannuthy (India). Centre for Advanced Studies in Animal Genetics and Breeding. Usha, A.P.; College of Veterinary and Animal Sciences, Mannuthy (India). Centre for Advanced Studies in Animal Genetics and Breeding.. Study on the Association of Three Microsatellite DNA Markers with Milk Fat Percentage in Crossbred Dairy Cattle of Kerala. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 46-50 KEYWORDS: DAIRY CATTLE. MICROSATELLITES. DNA. MILK FAT. FAT GLOBULES.

The aim of this study was to analyse the genetic variation of three

microsatellite DNA loci (ILSTS096, BL41 and BM1508) associated with the milk fat percentage of crossbred dairy cattle of Kerala. The PCR amplified products were detected by denaturing polyacrylamide gel electrophoresis and subsequent autoradiography. Polymorphic information content (PIC), Direct count heterozygosity and unbiased heterozygosity of microsatellites ranged 0.63–0.87, 0.68–0.88 and 0.69–0.89 respectively. The allelic averages of milk fat percentage of allele 188 and allele 204 of ILSTS096 were significantly lower than those of other alleles of the same locus. A significantly higher milk fat percentage was observed in animals with the allele 198 of ILSTS096 locus, compared to the animals without this allele. Animals with allele 240 and 242 at BL41 locus showed significantly higher and significantly lower milk fat percentage respectively when compared with the animals without these alleles. Animals with the alleles 109 and 113 at BM1508 locus showed a significantly higher milk fat percentage when compared with the animals without these alleles.

**264.** Singh, M.K.; Central Avian Research Institute, Izatnagar (India). Singh, H.N.; Central Avian Research Institute, Izatnagar (India). Gupta, Atul; Central Avian Research Institute, Izatnagar (India). Shukla, P.K.; Central Avian Research Institute, Izatnagar (India). Sharma, Deepak; Central Avian Research Institute, Izatnagar (India).. PCR based sex differentiation in guinea fowl using W chromosome specific sequences. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 560-562 KEYWORDS: GUINEA FOWL. SEX DIFFERENTIATION. SEXUAL DIMORPHISM. PCR.

In view of poor sexual bimorphism in guinea fowl, an attempt was made to develop PCR based method for sex differentiation using W chromosome specific sequence. A 370 bp sex specific fragment was amplified in female birds of guinea fowl, chicken, quail and turkey using the EE0.6 specific set of primers i.e. USP1 and USP3, while no amplification was observed in male birds. The 16S rRNA gene specific primers were used to amplify a ~590 bp fragment in both the sexes, which acted as control. A multiplex PCR assay was developed by using sex specific primers and universal 16S rRNA primers for sex differentiation in guinea fowl and other galliformes species. In all the species including guinea fowl, female showed 2 bands i.e. 370 bp female specific and 590 bp common band, while males showed only 590 bp band. These results showed the effectiveness of sex specific primers in sex differentiation in guinea fowl as well as other galliformes species.

**265.** Gana, T.A.S.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Misra, S.S.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Sheikh, F.D.; Sher-e-Kashmir University of Agricultural Science and

Technology, Srinagar (India).. Characterization and evaluation of Pashmina producing Changthangi goat of Ladakh. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 592-599 KEYWORDS: GOATS. WOOL. JAMMU AND KASHMIR. WOOL PRODUCTION.

Changthangi is a well recognized breed of goat popular for its valuable produce called pashmina. The breeding tract of this goat is in the Changthang area of Leh district of Jammu & Kashmir State and is adjacent to Tibet. The breed is well adapted to the local cold arid agro-climatic conditions of the region and is reared mainly by a nomad known as 'Changpa'. The fibre produced by this breed is the prime source for the world-class shawl industry of Kashmir. The study was carried out in 15 strata comprising 50 villages and their adjoining areas distributed throughout the breeding tract of the breed. The information collected include nature and type of native environment of the breeding tract, managemental practices, different physical characteristics like body colour, head profile, ears, horns, coat characteristics, body measurement traits; production traits like body weight at different ages, Pashmina production and quality traits, dairy performance, carcass characteristics and reproduction traits of Changthangi goat. Pashmina is unique among the animal fibres for its warmth, lightness and better ability to absorb dyes and moisture compared to mohair and wool. In addition to pashmina, this goat is also reared for chevon, milk, manure, pelt and even carriage. The number of this goat is presently in decline and restricted mainly to Changthang area. Changthang region has harsh climatic dryness (with very low rainfall) and temperature varies from  $-40^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ . The majority of the animals have white coat, though brownish red, fawn, grey and black animals are also seen. The horns are brown and mostly curved in shape. The average pashmina production was  $248.60 \pm 4.18$  g/animal. The overall fine hair, guard hair, dusting loss percentages, fibre length, guard hair length, scouring yield and fibre diameter were  $62.36 \pm 2.56\%$ ,  $31.98 \pm 2.94\%$ ,  $12.18 \pm 1.40\%$ ,  $4.09 \pm 0.04$  cm,  $56.90 \pm 2.80$  mm  $70.52 \pm 1.51\%$  and  $11.99 \pm 0.22\mu$ , respectively. The major breeding season is July- November. The information generated from this study shall be of immense help in devising scientific improvement programmes for this breed.

**266.** Peruma, P.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Selvaraju, S.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Barik, A.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Mohanty, D.N.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Das, S.; Orissa University of Agriculture and Technology, Bhubaneswar (India). Mishra, P.C.; Orissa University of Agriculture and Technology, Bhubaneswar (India).. Role of reduced glutathione

in improving post-thawed frozen seminal characters of poor freezable Jersey crossbred bull semen. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 807-810 KEYWORDS: BULLS. SEMEN. SEMEN PRESERVATION.

The role of reduced glutathione in improving the post thaw seminal characters in good and poor freezable Jersey crossbred bull semen was studied. And from each group 18 ejaculates were taken where tris extender supplementing with reduced glutathione 5mM was used for the experiment; thereafter, rapid freezing in liquid nitrogen was followed by thawing. The post-thawed seminal characters were studied to observe efficacy of addition of glutathione. The total motility showed significant difference between the 2 groups in both freezable bull semen, whereas livability, total sperm abnormality, loss of acrosomal integrity, percentage of hypo osmotic swelling positive sperm and vanguard distance travelled by sperm (mm/hour) in cervical mucus were found highly significant between the reduced glutathione treated and control group. However, the lipid peroxide levels as assessed by malondialdehyde formation were nonsignificant between the 2 groups, but the glutathione had reduced the production of more ROS as compared to the control group. The addition of reduced glutathione had maintained the functional state of good semen and enhances frezability of poor semen. Thus the reduced glutathione improves post thaw sperm functional parameters such as motility, viability, functional membrane and acrosomal integrity in poor freezable semen suggesting that addition of reduced glutathione in semen might have improved post-thawed seminal characters of crossbred bull frozen semen.

**267.** Malik, S.; Indian Veterinary Research Institute, Izatnagar (India) Satish Kumar; Indian Veterinary Research Institute, Izatnagar (India) Rajni Rani; Indian Veterinary Research Institute, Izatnagar (India). Kappa casein gene in water buffaloes using polymerase chain reaction and sequence specific oligonucleotide probes (PCR-SSOP). Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 856-858 KEYWORDS: WATER BUFFALOES. CASEIN. MILK PROTEIN. POLYMORPHISM. PCR.

Polymorphism of kappa casein gene was studied in genomic DNA samples isolated from peripheral blood lymphocytes of 24 animals of Murrah breed of buffaloes using polymerase chain reaction and sequence specific oligonucleotide probes. The primer and probes for the amplification and hybridization of the variable fragments of the CASK gene was designed from the published nucleotide sequence of the cattle. PCR amplification of buffalo DNA samples and probe hybridization confirmed the homology between the 2 species at nucleotide level. In spite of homology, buffalo DNA samples did not

show any polymorphism, instead monomorphism was observed at CASK gene. However, in kappa casein gene an interesting hybridization pattern was observed. The kappa casein gene shows monomorphism but it is like CASK-A allele of cattle at codon 136 i.e. ACC (Thr) and like B allele of cattle at codon 148 i.e. GCT (Ala) at the nucleotide level confirming the earlier report on protein sequence.

**268.** Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Yathish, H.M. Sharma, Ashwani Vijay Kumar Jain, Asit Chakraborty, D. Avtar Singh Tantia, M.S.; National Dairy Research Institute, Karnal (India). Genetic polymorphism of SLC35A3 gene in Karan Fries bull calves. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 951-953 KEYWORDS: CALVES. GENETIC POLYMORPHISM. CROSSBREDS. GENETIC DISORDERS. PCR. RFLP.

Solute carrier family 35 member 3 (SLC35A3) gene encodes the nucleotide sugar transporter that plays a pivotal role in the development of skeletal system. Point mutation from guanine (G) to thymine (T) at nucleotide position 559 of bovine SLC35A3 gene causes an inherited autosomal recessive disorder called complex-vertebral-malformation (CVM). In the present study 55 young Karan Fries bull calves born during the period of 2006–09, maintained at NDRI, Karnal were screened for the presence of CVM affected or carrier animals. PCR-RFLP band pattern using Pst I restriction enzyme showed the products of 287 bp in size, which confirmed the animals we screened are neither carrier nor affected. This work is important in suggesting our country to make the screening of HF crossbreds for various recessive genetic disorders as mandatory to contain their spread, eventually to make the animal husbandry an economical endeavour.

**269.** Srinivasa, Rao T.; NTR College of Veterinary Science, Gannavaram (India) Srinivasa, Prasad Ch.; NTR College of Veterinary Science, Gannavaram (India) Shah, Showkat Ahmed; Sher-e-Kashmir University of Agricultural Science and Technology, Kashmir (India).

Rather, Mudasir Ali; Sher-e-Kashmir University of Agricultural Science and Technology, Kashmir (India).. RNA Interference and its therapeutic applications. *Veterinary World (India)*. (May 2011) v.4(5) p. 225-229 KEYWORDS: RNA. NUCLEOTIDE SEQUENCE.

RNAi is a potent method, requiring only a few molecules of dsRNA per cell to silence the expression. Long molecules of double stranded RNA (dsRNA) trigger the process. The dsRNA comes from virus and transposon activity in natural RNAi process, while it can be injected in the cells in experimental processes. The strand of the dsRNA that is identical in sequence to a region in target mRNA molecule is called the sense strand, and the other strand which is complimentary is termed the antisense strand. An enzyme complex called DICER thought to be similar to RNAase III then recognizes dsRNA, and cuts it into roughly 22- nucleotide long fragments. These fragments termed siRNAs for small interfering RNAs remain in double stranded duplexes with very short 3' overhangs. However, only one of the two strands, known as the guide strand or antisense strand binds the argonaute protein of RNA-induced silencing complex (RISC) and target the complementary mRNA resulting gene silencing. The other anti-guide strand or passenger strand is degraded as a RISC substrate during the process of RISC activation. This form of RNAi is termed as post transcriptional gene silencing (PTGS); other forms are also thought to operate at the genomic or transcriptional level in some organisms. In mammals dsRNA longer than 30 base pairs induces a nonspecific antiviral response. This so-called interferon response results in a nonspecific arrest in translation and induction of apoptosis. This cascade induces a global non-specific suppression of translation, which in turn triggers apoptosis. Interestingly, dsRNAs less than 30 nt in length do not activate the antiviral response and specifically switched off genes in human cells without initiating the acute phase response. Thus these siRNAs are suitable for gene target validation and therapeutic applications in many species, including humans.

**270.** Kumar, Davendra; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Physiology and Biochemistry. Joshi, Anil; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Physiology and Biochemistry. Naqvi, S.M.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Physiology and Biochemistry.. Sperm Motion Characteristics of Patanwadi Ram Lambs Reared Under Semi-Arid Tropical Environment. *Indian Journal of Small Ruminants (India)*. (Apr 2011) v. 17(1) p. 41-47 KEYWORDS: SHEEP. SEMEN. SEMEN PRESERVATION.

Eight Patanwadi ram lambs were raised under intensive management system and were trained for semen collection at a

weekly interval from the age of 6 months. Ram lambs were scheduled for semen collection at a weekly interval up to one year of age to assess their potential for semen production and to evaluate objectively their semen quality by computer-aided semen analysis (CASA) technique. The data derived from CASA estimates were subjected to GLM multivariate analysis. The average age of Patanwadi ram lambs at the time of first ejaculation was 199 days (ranging from 181 to 259 days). The body weight of ram lambs was significantly ( $p < 0.05$ ) and positively correlated

**271.** Bhat, F.A.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Bhattacharyya, H.K.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Khan, M.Z.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry.. Biometry of female genitalia and in vitro tubal patency tests in local sheep of Kashmir valley. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 170-173 KEYWORDS: SHEEP. LAND RACES. REPRODUCTION. BIOMETRY. JAMMU AND KASHMIR.

Sixty-six non-gravid female genitalia of local sheep of Kashmir valley were collected from the abattoir immediately after slaughter to study the biometry of different parts of genitalia and tubal patency. The left ovary measured slightly larger than right ovary. The measurements of other parts of genitalia were more or less similar to the measurements recorded in other breeds of sheep of India. Normal patency of the fallopian tube was recorded in 77.42% cases and rest of the cases with either unilateral (16.13%) or bilateral (6.45%) blockade.

**272.** Lone, F.A.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Islam, R.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Khan, M.Z.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Sofi, K.A.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. Khan, I.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India). Faculty of Veterinary Science and Animal Husbandry. . Effect of post-mortem time on the quality of ram cauda epididymal spermatozoa. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 174-177 KEYWORDS: RAMS. SPERMATOZOA. TESTES. POSTMORTEM CHANGES.

A total of 36 ram testicles were collected from two local slaughter houses in Srinagar city and divided into four groups as per the post-mortem time. All the testicles were transported in normal saline and processed between 1–5 hrs (Gr I), between 6–10 hrs (Gr II), between 11–15 hrs (Gr III) and between 16–20 hrs (Gr IV) after slaughter. The mean testicular weights for group I, II, III and IV were  $155.9 \pm 21.4$ ,  $174.5 \pm 13.3$ ,  $149.4 \pm 11.7$  and  $166.8 \pm 23.1$  g, respectively and the corresponding values for cauda weight were  $6.90 \pm 1.01$ ,  $9.13 \pm 0.70$ ,  $8.18 \pm 0.60$  and  $7.86 \pm 0.90$  g. Sperm motility declined significantly from Gr I (85.0%) to Gr IV (70.56%). The sperm motility was significantly ( $P < 0.01$ ) higher for Gr I than the other three groups. However, the difference was non-significant between Gr I and II and between Gr II and III. The mean live sperms were 92.5, 89.5, 89.67 and 83.28% for Gr I, II, III and IV, respectively. The mean intact acrosome percent also did not differ significantly between the four groups. The minor sperm abnormality percent increased non-significantly from Gr I to IV and was mainly contributed by distal cytoplasmic droplet which is considered as a normal part of sperm maturation process. Also the major sperm abnormality did not show any definite trend from Gr I to IV. In conclusion, the quality of ram cauda epididymal spermatozoa did not deteriorate even at 20 hrs after slaughter.

#### **L40 Animal structure**

**273.** Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Varinder, Uppal; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Anuradha; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).. Nephrotoxic effects caused by formaldehyde exposure in rabbits: A histomorphochemical study. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 935-937 KEYWORDS: RABBITS. KIDNEYS. FORMALDEHYDE. ANIMAL MORPHOLOGY.

The experiment was conducted to observe the effect of direct exposure of formaldehyde in different concentrations on the physio-anatomy of kidneys. For this purpose, 14 rabbits ageing 3– 6 months were divided into 3 groups; group 1 (n, 6) were exposed to 10% formaldehyde solution for 12 weeks, group 2 (n, 6) to 40% formaldehyde solution for 6 weeks and group 3 (n, 2) served as control. After completion of experimental periods, fresh tissue samples were collected from both the kidneys for the demonstration of enzymes and some part of samples were also preserved in 10% NBF to study histological changes. The present study revealed that after an exposure to 40% formaldehyde solution, there was degeneration of glomeruli and tubular epithelium with necrosis of proximal and distal convoluted tubules. Marked congestion and

haemorrhages were also seen in the glomeruli and intertubular blood vessels. There was weak activity of AKPase, ATPase, G-6-Pase, SDH, LDH and G-6-PD, and moderate to strong reaction of NADPH and NADH in the renal glomeruli, proximal and distal convoluted tubules. The alterations in the distribution pattern of phosphatases and oxidoreductases in the rabbit kidney reflect the impairment in the renal functions due to formaldehyde exposure.

### **L50 Animal physiology and biochemistry**

**274.** Vaidya, M.M.; National Dairy Research Institute, Karnal (India). Dairy Cattle Physiology Division. Singh, S.V.; National Dairy Research Institute, Karnal (India). Dairy Cattle Physiology Division. Kumar, Parveen; National Dairy Research Institute, Karnal (India). Dairy Cattle Physiology Division. Singh, A.K.; National Dairy Research Institute, Karnal (India). Dairy Cattle Physiology Division. Kushwaha, Raju; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Pathan, M.M.; National Dairy Research Institute, Karnal (India). Dairy Cattle Physiology Division. Balhara, A.K.; Central Institute for Research on Buffaloes, Hisar (India).. Effect of Ambient Temperature Rise on Heat Storage in Murrah Buffaloes During Different Seasons. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 66-69 KEYWORDS: WATER BUFFALOES. ENVIRONMENTAL FACTORS. SEASONS. BODY TEMPERATURE. BIOLOGICAL RHYTHMS.

Rhythmicity in physiological parameters is an important process both as convenient and reliable markers of operation of the biological clock and as an indicator of general health of an animal. In order to find out the heat storage in adult and growing Murrah buffaloes, 6 each of growing and adult female Murrah buffaloes were selected from National Dairy Research Institute (NDRI) herd for this study. The experiment was conducted in three seasons i.e. winter (Dec-Jan), spring (Feb-March) and summer (April-May). Rectal temperature (RT) and skin temperature (ST) were recorded during 4.00 hrs interval i.e. 6.00, 10.00, 14.00, 18.00, 22.00 and 2.00 hrs. The circadian variation in Skin temperature and rectal temperature was found to be maximum at 2.00 PM during summer season compared to spring and winter season. The heat storage was also observed highest at 2.00 PM in adult Murrah compared to growing during summer season. Physiological parameters (RT and ST) increased significantly ( $P < 0.01$ ) during spring and summer season compared to winter in both growing and adult buffaloes. Therefore young buffaloes should be protected from extreme hot conditions and direct sun exposure be avoided.

**275.** Singh, A.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Prabhakar, S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Brar, P.S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Uppal, S.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Prahlad Singh; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Gandotra, V.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. Blood biochemical profiles and physical-activity parameters in neonatal buffalo calves under normal and forced calving. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 570-574 KEYWORDS: CALVES. NEWBORN ANIMALS. BLOOD COMPOSITION.

The evaluation of metabolic homeostasis in difficult parturition is vital to clinical recognition of underlying disorders to provide appropriate therapeutic measures. The biochemical status of buffalo calves delivered normally (n=17) and through manipulation and forced extraction (n=17) was studied over a period of 5 h immediately after calving. Plasma aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase, blood glucose and total protein were estimated within 1 h after sampling. Different physical-activity parameters like time from birth till first rise of head, time from birth till sternal recumbancy, time from birth till first attempt to stand-up, duration of fetus in womb after appearance of water bag, duration of fetal extraction/expulsion and time from birth until recovery from neonatal stress were also noted and correlated with metabolic changes. Alterations in the biochemical status were suggestive of metabolic changes with some compensation immediately after delivery in normally delivered (ND) calves. The calves delivered through forced extraction (FD) had elevated enzymatic profiles, which remained elevated up to 4 h post-delivery but improved over the period of time (up to 4 h) after calving. Furthermore, wider differences were recorded in the blood glucose values in the two set of calves revealing informative significance regarding the level of stress in the FD group. An alternative diagnostic tool, which appeared in estimating the condition of a newborn calf, was different physicalactivity parameters. Thus, blood biochemical estimation should be used as a matter of intensive care and corrective measures adopted in neonates.

**276.** Sarma, K.; Central Agricultural University, Aizawl (India). Konwar, B.; Central Agricultural University, Aizawl (India). Ali, A; Central Agricultural University, Aizawl (India). Das, G.; Central Agricultural University, Aizawl (India) Kalita, G.; Central Agricultural University, Aizawl (India) Ahmed, F.A.; Central Agricultural University, Aizawl (India). Aikia, B.S.; Central Agricultural University, Aizawl

(India). Bayan, H.; Central Agricultural University, Aizawl (India). Nayan, V.; Central Agricultural University, Aizawl (India). Haemato-biochemical parameters of Burmese pig of subtropical hill agro ecosystem. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 819-821 KEYWORDS: SWINE. BLOOD COMPOSITION. SUBTROPICAL ZONES.

Normal Burmes pigs (100) were selected for haemato-biochemical studies. The mean values for different hematological parameters, viz. packed cell volume (PCV), total erythrocyte count (TEC), total leukocyte count (TLC) and hemoglobin (Hb) were studied. The MCV (fl), MCH (pg) and MCHC (g/dl) ranged from  $56.06 \pm 1.00$  to  $60.35 \pm 0.51$ ,  $14.70 \pm 0.19$  to  $16.56 \pm 0.52$  and  $31.15 \pm 0.70$  to  $35.05 \pm 0.60$  respectively. The neutrophil (%), lymphocytes (%), monocytes (%), basophil (%) and eosinophil (%) ranged from 28.92 to 58.36, 28.60 to 59.24, 8.48 to 12.88, 1.44 to 1.60 and 1.48 to 1.92 respectively. The Hb, TEC, PCV, TLC, MCHC increased with the age of the pigs. The mean serum glucose (mg/dl) level ranged from  $155.10 \pm 6.07$  to 214.27. The values obtained for serum cholesterol (mg/dl), serum albumin (g/dl), serum total protein (g/ dl), serum urea nitrogen (mg/dl) and serum bilirubin (mg/dl) ranged between 109.68 to 114.72, 3.05 to 3.46, 6.36 to 7.01 and 23.37 to 26.96 and 0.06 to 0.102 respectively. The mean values of serum transaminases, viz. AST and ALT increased with increase in age.

**277.** Das, Gunjan; Indian Veterinary Research Institute, Izatnagar (India). Sharma, M.C.; Indian Veterinary Research Institute, Izatnagar (India). Joshi, Chinmay; Indian Veterinary Research Institute, Izatnagar (India).. Efficacy of an area specific mineral mixture on the haemato-biochemical profile of cattle of the state of Tripura. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 968-970 KEYWORDS: CATTLE. BLOOD COMPOSITION. MINERAL NUTRIENTS. SUPPLEMENTS. TRIPURA.

A study was conducted to record the mineral status in soil, fodder and serum from four districts of Tripura state. There is a significant deficiency of P, Zn, and Cu in the soil, fodder, serum (cattle) of Tripura state. Lower values of AST (U/L) and ALT (U/L) were observed whereas, higher values of AKP (U/L) were observed in all the districts. The levels of haemoglobin, packed cell volume and total erythrocyte count were towards lower side of normal range. A mineral mixture was prepared according to the deficiency obtained. Therapeutic trial was conducted on some cattle in local and Govt. dairy farm for 90 days. Significant improvement was observed in haemato-biochemical status of the deficient animals.

**278.** Pandey, Vijay; College of Veterinary and Animal Sciences, Mathura (India). Department of Biochemistry. Sareen, Meenaxi; College of Veterinary and Animal Sciences, Bikaner (India). Department of Veterinary Biochemistry. Moolchandani, Anil; College of Veterinary and Animal Sciences, Bikaner (India). Department of Veterinary Biochemistry. Singh, Raghvendra; National Research Centre on Camel, Bikaner (India).. Influence of Sex on Thyroid Hormone and Biochemical Profile in Marwari Goats Under Arid Tropical Environment. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 48-52 KEYWORDS: GOATS. THYROID HORMONES. BIOCHEMISTRY.

In order to determine whether thyroid hormone and other blood components were affected by gender in Marwari goats, these components were estimated in 30 clinically healthy goats of either sex. The gender effect was studied on thyroxin, triiodothyronine (T3), glucose, total protein, albumin, globulin, AG ratio, urea, cholesterol and creatinine. The significant effect of gender was observed on the mean concentrations of serum creatinine and T3. The mean serum creatinine concentration in male was found to be higher than in female goats while serum T3 values were observed to be higher in female than male goats. The gender effect on other parameters like serum glucose, cholesterol, urea, total protein, albumin, globulin and T4 was observed to be non-significant. It was concluded that serum T3 and creatinine were influenced by gender in Marwari goats.

**279.** Kumar, Manish; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). College of Veterinary Science, Department of Veterinary Physiology and Biochemistry. Jindal, R.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). College of Veterinary Science, Department of Veterinary Physiology and Biochemistry. Nayyar, S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). College of Veterinary Science, Department of Veterinary Physiology and Biochemistry.. Influence of heat stress on antioxidant status in Beetal goats. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 178-181 KEYWORDS: GOATS. HEAT STRESS. ANTIOXIDANTS. VITAMINS. BLOOD COMPOSITION. ENZYMES.

Oxidative stress may be a crucial factor affecting heat tolerance, thus affecting productive / reproductive performance in farm animals. The effect of summer heat stress was evaluated on the status of various parameters related to oxidative stress. Haematological parameters (packed cell volume and haemoglobin), antioxidant vitamins (vitamins C and E) and enzymes (glutathione peroxidase and superoxide dismutase) were assessed in Beetal goats during pre-summer and summer months. Stressed goats exhibited lower levels of haemoglobin, packed cell volume, vitamin C and E.

The activity of glutathione peroxidase was lowered and superoxide dismutase activity increased. It was concluded that oxidative stress was increased in goats during summer.

### **L51 Animal physiology - Nutrition**

**280.** Das, K.C.; National Research Centre on Mithun, Jharnapani (India). Baruah, K.K.; National Research Centre on Yak, Dirang (India). Haque, N.; National Research Centre on Mithun, Jharnapani (India). Sharma, R.; National Research Centre on Mithun, Jharnapani (India). Rajkhowa, C.; National Research Centre on Mithun, Jharnapani (India). Effect of Different Dietary Protein Levels on Growth, Nutrient Utilization and Rumen Fermentation in Mithun (*Bos frontalis*) Fed on Rice Straw based Diet. *Animal Nutrition and Feed Technology* (India). (Sep 2012) v. 12(3) p. 305-313 KEYWORDS: BOVINAЕ. RICE STRAW. RICE. PROTEINS. GROWTH RATE. NUTRITION PHYSIOLOGY. RUMEN DIGESTION.

To assess the growth, nutrient utilization and rumen fermentation pattern in growing mithun (*Bos frontalis*) calves fed on different levels of dietary protein fed on paddy straw based diet, 21 male mithun of about 10-12 months of age were divided into three groups. The animals of each group was fed on rice straw-based iso-energetic diet containing three levels of dietary CP viz. 80 (LP), 100 (MP) and 120 (HP) g/kg DM to represent low, medium and high protein diets. Fortnightly body weight gain and daily DM intake were recorded. After 6 months, a metabolism trial was conducted. Rumen liquor was collected from three groups of animals and analysed. The experiment was continued for 42 weeks. The average daily gain (ADG) exhibited by LP, MP and HP group of calves were 0.464±0.03, 0.476±0.04 and 0.477±0.02 kg, respectively, with no differences ( $P > 0.05$ ) among the groups. The digestibility of nutrients remained similar except for a higher ( $P > 0.05$ ) CP digestibility in HP group of calves. Higher ( $P > 0.05$ ) intake of nitrogen in HP group was accompanied by higher ( $P > 0.05$ ) excretion though both faeces and urine leading to similar ( $P > 0.0$ ) retention among the three groups. Rumen parameters revealed that level of ammonia nitrogen as well as activities of protease and urease enzymes increased significantly ( $P > 0.05$ ) with increasing CP level; whereas  $\alpha$ -amylase activity was significantly lower in HP fed animals than other two groups. Similarly the carboxymethyl-cellulase and xylanase activities were reduced in MP and HP as compared to LP. Overall, it was concluded that male growing mithun calves may be reared with the rice straw based diet containing minimum protein level of 80 g/kg DM.

**281.** Patel, V.R.; Anand Agricultural University, Anand (India). College of Veterinary Science & Animal Husbandry, Animal Nutrition Research Station. Gupta, R.S.; Anand Agricultural University, Anand (India). College of Veterinary Science & Animal Husbandry, Animal Nutrition Research Station. Parnerkar, S.; Anand Agricultural University, Anand (India). College of Veterinary Science & Animal Husbandry, Animal Nutrition Research Station. Jani, V.R.; Gujarat Livestock Production Company Ltd., Gandhinagar (India) Garg, D.D.; Anand Agricultural University, Anand (India). College of Veterinary Science & Animal Husbandry, Animal Nutrition Research Station.. Performance of Buffalo Heifers fed on Bypass Protein: An On-farm Appraisal. *Animal Nutrition and Feed Technology (India)*. (Sep 2012) v. 12(3) p. 395-402 KEYWORDS: HEIFERS. ON-FARM RESEARCH. PROTEIN CONCENTRATES. DIGESTIBILITY. GUJARAT.

The effect of compounded concentrate mixture with bypass protein (formaldehyde treated) on nutrient utilization and economics of feeding was studied. The on-farm trial was conducted on 24 growing buffalo heifers for a period of 24 weeks in a tribal belt of Panchmahal district, Gujarat. The selected animals with an average age of 246±4.8 days and 75.2±2.42 kg body weight were divided in to two groups of 12 each. The selected animals were fed with compound concentrate mixture (20% CP), with bypass protein source in treatment group (T2) and without bypass protein in control group (T1). Paddy straw was offered ad lib. along with 2.0 kg of green pasture grass in both groups. The digestibility of nutrients like DM, CP, EE and CF was significantly improved ( $P \leq 0.05$ ) in treatment group (T2). The DM required to achieve unit gain (kg/kg gain) was significantly higher ( $P \leq 0.01$ ) in group T1 (8.43±0.39) than in group T2 (6.41±0.14). Similar significant differences were observed for intake of nutrients like CP, DCP and TDN per kg gain. The daily feed cost per kg gain was significantly ( $P \leq 0.01$ ) lower in T2 (Rs.27.79) as compared to T1 (Rs.31.45). Results indicated that the nutrient utilization and economics of raising buffalo heifers could be significantly improved in feeding of bypass protein containing concentrate mixture.

**282.** Divya; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Tiwari, D.P.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Anil Kumar; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India).. Effect of undegradable dietary protein levels and plane of nutrition on feed intake, water metabolism and blood biochemical constituents in crossbred heifers. *Indian Journal of Animal Sciences (India)*. (June 2011) v. 81 (6) p. 637-640 KEYWORDS: HEIFERS. FEED INTAKE. WATER METABOLISM. BLOOD COMPOSITION.

The present study was conducted to discern the effect of concentrate mixture containing 2 UDP levels from plant sources at 2 planes of feeding on feed intake, weight gain, water metabolism and certain haematobiochemical constituents in crossbred heifers. An experiment was conducted in crossbred heifers (16), 15 to 19 months old, randomly divided into 4 groups of 4 each in a 2 × 2 factorial completely randomized design and were fed 4 dietary treatments for 116 days. Mixed oat green and oat hay sowed as roughage. The average daily dry matter consumption did not differ significantly among groups. The heifers in treatment group 3 fed high UDP ration at higher plane of feeding gained highest daily body weight (0.80 kg) followed by treatment groups 4 (0.75 kg), 1 (0.67 kg) and lowest in heifers in treatment group 2 fed low UDP ration at normal plane of feeding (0.59 kg). The daily body weight gain was improved by 10.45% due to high UDP ration and 23.8% due to higher plane of feeding. The daily water intake and water excretion did not differ significantly amongst the groups. However, water loss was more in faeces and less in urine due to high UDP ration but plane of feeding had no significant effect. The blood serum concentration of total protein, albumin, globulin, cholesterol, calcium and phosphorus and activities of SGOT, SGPT and serum alkaline phosphatase did not differ significantly amongst the treatment groups, however, there was higher concentration of serum total protein, calcium content and SGPT activity due to high UDP ration. The higher plane of feeding also increased serum albumin and phosphorus content and SGPT activities significantly. It is concluded that feeding high UDP ration (50: 50 RDP: UDP ratio) with 115% of nutrients as recommended in NRC 1989) feeding standard under Indian condition is advantageous in improving the weight gain in crossbred heifers at later stage of growth without affecting the feed and water intakes and with normal blood biochemical constituents.

**283.** Sridhar, Manpal; National Institute of Animal Nutrition and Physiology, Bengaluru (India) Senani, S.; National Institute of Animal Nutrition and Physiology, Bengaluru (India) Bhatta, R.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Production of proteases and lignolytic enzymes during solid state fermentation (SSF) of finger millet straw (*Eleusine coracana*). Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 723-729  
KEYWORDS: STRAW. BARLEY STRAW. FERMENTATION. PROTEASES. RUMINANTS.

The effect of fermentation on secretion of proteases and lignolytic enzymes was evaluated in non pretreated (UT), steamed for 10 min (ST) and 4% urea treated (UrT) finger millet straw for 5 days in bulk quantities under laboratory conditions with 4 species of white rot fungi, viz. *Pleurotus sajorcaju*, *Pleurotus ostreatus*, *Voriiallae*

volvoraeeae and Phanerochaete chrysosporium. Fermentation with *V. volvoraceae* recorded the minimum increase in protein of 1.99, 2.22 and 2.98% respectively in the untreated, steamed and urea treated straw. Dry matter showed a decrease for the 3 treatments upon fermentation with *P.chrysosporium* while the highest losses ranging between 10.99 for the untreated to 15.75% for the urea treated straw were observed upon fermentation with *V.volvoraceae*. Though the ash contents increased the difference was not significant. There were also consistent significant decreases in the values obtained for cell wall components (NDF, ADF ADL). In vitro dry matter digestibility increased with all the 3 treatments in the 4 fungi as compared to control value of  $40.0 \pm 3.65$ . *P.chrysosporium* recorded highest values of  $76.10 \pm 3.86$  for UT,  $82.70 \pm 0.45$  for ST and  $87.20 \pm 2.02$  for UrT followed by *P.ostreatus* and *P.sajor caju* while lowest increase in digestibility values of  $58.09 \pm 0.54$  for UT,  $59.23 \pm 0.64$  for ST and  $62.57 \pm 2.6$  for UrT was obtained in *V.volvoraceae*. A concomitant increase in the lignolytic enzymes laccase, manganese peroxidase and lignin peroxidase was obtained for all the 3 treatments up to the fifth day of fermentation. High protease activity was observed during the first 2 days of fermentation with steamed ragi straw fermented with *P. chrysosporium* recording the highest activity of 2641 units on the second day. In conclusion, *P.chrysosporium* and *P. ostreatus* proved the most promising strains for improving the digestibility of finger millet straw for ruminants and secretion of these enzymes by these fungi for pretreating lignocellulosics for feeding ruminants can safely be manipulated.

**284.** Jadhav, S. E.; Defence Research and Development Organization, Leh-Ladakh (India). Guru Charan; Defence Research and Development Organization, Leh-Ladakh (India). Tilak, Raj K.; Defence Research and Development Organization, Leh-Ladakh (India). Bharti, Vijay K.; Defence Research and Development Organization, Leh-Ladakh (India). Singh, Shashi Bala; Defence Research and Development Organization, Leh-Ladakh (India). Performance and blood biochemical profile of lambs fed local unconventional feed ingredients at cold and high altitude conditions of Ladakh. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 730-734  
KEYWORDS: LAMBS. FEEDS. FEED CRUCIFERS. FEED GRASSES. FEED MEALS. ALTITUDE. JAMMU AND KASHMIR.

The study was conducted to assess the effect of feeding local unconventional feed ingredients on performance and blood biochemical profile of lambs at high altitude cold arid conditions of Ladakh. Healthy male Muzaffarnagri  $\times$  Changthangi crossbred lambs (18), 3- to 4- month-old, weighing on average  $12.4 \pm 0.77$  kg were equally divided into control and local feed resources (LFR) groups and fed respective feeds for 130 days. LFR comprised seabuckthorn

leaves, seabuckthorn pomace, willow and popular tree leaves and apricot cake as local unconventional feed ingredients along with other conventional feed ingredients that were used in control feed. Average daily temperature and relative humidity during the experimental period was  $-1.76^{\circ}\text{C}$  and 64.89%, respectively. Blood samples were collected from all the animals at the end of the experiment. There was no difference in average daily gain (ADG) in body weight (BW), dry matter intake (DMI) and feed: gain ratio between the groups, however feeding of local feed resources resulted in reducing trend in feeding cost per unit BW gain of lambs. Blood hemoglobin, serum glucose, total protein, urea, blood urea nitrogen, creatinine, triglycerides, calcium, phosphorus, sodium and potassium concentrations did not differ among the groups. Serum uric acid increased significantly in LFR group as compared to control group. Moreover serum total protein concentration in lambs fed LFR feed showed increasing trend as compared to lambs fed control feed. These results indicated that feeding of local unconventional feed ingredients in complete feed of lambs had no adverse effect on performance and blood biochemical profile of lambs. On contrary, feeding of these ingredients in complete feed provided adequate nutrition to support normal body growth of lambs indicating that these ingredients are futuristic potential feed resources for animals at high altitude cold arid regions of Ladakh. Key words: Apricot cake, High altitude, Sheep, Seabuckthor.

**285.** Sirohi, S.K.; National Dairy Research Institute, Karnal. Pandey, Neha; National Dairy Research Institute, Karnal. Madhu Mohini; National Dairy Research Institute, Karnal. Puniya, A.K.; National Dairy Research Institute, Karnal. Singh, B.; National Dairy Research Institute, Karnal. Kundu, S.S.; National Dairy Research Institute, Karnal (India). Thube, Harshala; National Dairy Research Institute, Karnal. Effect of monensin and anthraquinone supplementation on rumen fermentation and methane mitigation in vitro. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 859-863  
KEYWORDS: RUMEN DIGESTION. METHANE FERMENTATION. METHANE. MONENSIN. ANTHRAQUINONES. SUPPLEMENTS. IN VITRO.

The effects of addition of monensin sodium and anthraquinone on rumen fermentation and methane production with 3 diets having different roughage concentrate ratio (60:40, 50:50, and 40:60), roughage wheat straw and normal farm concentrate (20% CP and 70% TDN) was studied along with 4 levels of monensin sodium i.e. 0, 10, 15 and 20 ppm and of 9,10, anthraquinone i.e. 0, 20, 40 and 80ppm respectively. The effect of these compounds was studied after 24 h incubation ( $39\pm 1^{\circ}\text{C}$ ). Monensin and anthraquinone showed positive effect on methane reduction. Microbial biomass

yield significantly increased in both treatments in all 3 diets. Similar trend was noticed in ammonia nitrogen. Propionate production increased with the increasing dosage of monensin with decreased A/P ratio. Protozoal population reduced significantly by monensin sodium and anthraquinone supplementation. IVDMD values remained unchanged with monensin whereas anthraquinone supplementation increased it significantly in most of treatment combination.

**286.** Pal, D.T.; ICAR Research Complex for NEH Region, Umiam (India). Singh, Pramod; ICAR Research Complex for NEH Region, Umiam (India). Prasad, C.S.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Sampath, K.T.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Minerals release kinetics in the rumen from five commonly available dry fodders. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 954-960 KEYWORDS: RUMEN DIGESTION. RUMEN MICROORGANISMS. DESICCATED FODDERS. MICROORGANISMS. MINERAL METABOLISM.

The extent to which the macro and micro minerals present in various fodders released in the rumen were studied in 5 commonly fed dry fodders (paddy straw, ragi straw, wheat straw, maize kadbi and oat hay) in 3 adult cattle fitted with rumen cannula by in sacco nylon bag technique. The dry fodders were incubated in the rumen for different periods i.e. 10 h, 24 h, 48 h and 72 h and minerals release kinetics in the rumen were studied. There were significant differences in element release in the rumen between experimental fodders and the particular minerals. The rate of release of Ca and P was higher from oat hay and maize kadbi than from paddy, ragi and wheat straws. As compared to Ca, the release of P, Mg and K at different periods of incubation in the rumen was higher from various dry fodders. The pattern of Mg release was different from Ca and P. The release of individual elements over all incubation times is very well expressed by cubic polynomials ( $R^2 > 0.9$ ). Overall, across dry fodders, the release of mineral elements ranked as follows: K Mg P Cu Mn Zn Ca. Among all minerals, K showed the highest (98 to 100%) and Ca and Zn showed the lowest release in the rumen at different periods of incubation from fodders. It could, therefore, be concluded that the pattern of macro and trace minerals release in the rumen varied from feeds to feeds and the time of incubation influenced the release of minerals from fodders. Calcium and zinc need a longer time for their maximum release in the rumen for making it available for absorption.

**287.** Singh, Sultan; Indian Grassland and Fodder Research Institute, Jhansi (India). Gupta, A.; Indian Grassland and Fodder Research Institute, Jhansi (India). Singh, B.B.; Indian Grassland and Fodder Research Institute, Jhansi (India).. Effect of tree foliage supplementation to *Cenchrus ciliaris* hay diet on rumen microbial population, enzyme activities and water kinetics in sheep. Range Management and Agroforestry (India). (Dec 2011) v.32(2) p.113-117  
KEYWORDS:. Range Management and Agroforestry (India). (Dec 2011) v.32(2) p.113-117  
KEYWORDS: CENCHRUS CILIARIS. ENZYME ACTIVITY. MICROORGANISMS. SHEEP. WATER. LEAVES. TREES.

Four adult male sheep of local breed each with mean body weight  $29.0 \pm 4.03$  and  $22.32 \pm 2.14$  kg were fed *Cenchrus ciliaris*-*Leucaena leucocephala* (CC-LL) and *Cenchrus ciliaris*-*Grewia optiva* (CC-GO) diets separately. Grass (CC) and tree leaves (LL and GO) were fed in 75:25 proportions, respectively for 90 days on each diet. Rumen liquor samples were drawn at 0 and 4 h post feeding twice at 60 and 90 days feeding on each diet to enumerate the rumen microbes and enzymes and for water kinetics once at 90 days feeding. Total protozoa, entodiniomorphs and holotrichs counts were comparable in rumen liquor of sheep on CC-LL and CC-GO diets. Sheep rumen liquor had similar activity/number of total viable bacteria, cellulolytic and amylolytic bacteria on both diets, while proteolytic bacteria activity was higher (P0.05) on CC-GO diet. Entodiniomorphs and holotrichs constituted 80.05 & 19.95% and 78.5 & 21.5 % of total protozoa on CC-LL and CC-GO diet, respectively. In rumen liquor *Isotricha* and *entodinium* occurrence (%) was highest, and that of *polyplastron* and *ophryoscolex* was least. Rumen liquor of sheep fed C-GO had (P0.05) higher glutamate oxaloacetate transaminase (GOT), glutamate pyruvate transaminase (GPT) and glutamate dehydrogenase (GDH). Sheep rumen liquor had higher (P0.05) cellulase activity and outflow rate (l/d) on CC- LL diet. Inclusion of GO at 25 % level in grass based diet of sheep produced response similar to LL on microbes number, enzyme activity and water kinetics except rumen dilution rate.

**288.** Kannan, A.; National Dairy Development Board, Anand (India). Animal Nutrition Group. Garg, M.R.; National Dairy Development Board, Anand (India). Animal Nutrition Group. Kumar, B.V.; National Dairy Development Board, Anand (India). Animal Nutrition Group. Mahesh; National Dairy Development Board, Anand (India). Animal Nutrition Group.. Effect of ration balancing on milk production, microbial protein synthesis and methane emission in crossbred cows under field conditions in chittoor district of Andhra Pradesh. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 117-123  
KEYWORDS: COWS. CROSSBREDS. COMPLETE FEEDS. RATIONS. MICROBIAL PROTEINS. METHANE. LACTATION. ANDHRA PRADESH.

Effect of balancing the ration on milk production, microbial protein synthesis and methane emission was studied in 30 crossbred cows under field conditions in Chittoor district of Andhra Pradesh. Nutritional status of animals was analysed by ration balancing software and methane emission by sulphur hexafluoride technique. Microbial protein synthesis was calculated by estimation of purine derivatives excreted in urine. Initially, baseline data for all the animals were estimated and thereafter their ration was balanced as per their nutrient requirements by using ration balancing software. After 30 days of feeding again all the parameters were estimated. Analysis of the feeding practices revealed that dietary intake of TDN was adequate but CP intake was lower (10.44%) than their requirements. The calcium and phosphorus were also deficient by 47.81 and 46.52%, respectively. Balancing the ration did not affect body weight, dry matter intake, TDN intake and concentrate roughage ratio. CP intake was improved significantly (P0.05) after balancing the ration. Though milk fat was not affected, balancing of ration significantly (P0.05) improved the milk yield and reduced methane production. The average methane emission reduction was 11.17 and 19.62%, in terms of g/d and g/kg DMI, respectively, besides reducing (P0.05) the gross energy lost as methane. The calculated microbial nitrogen supply (g/d) was also significantly higher (P0.05) after balancing the ration. It was concluded that ration balancing has the potential to improve milk production, microbial protein synthesis and reduce methane emission from lactating crossbred cows.

**289.** Gupta, Arti; Indian Grassland and Fodder Research Institute, Jhansi (India). Singh Sultan; Indian Grassland and Fodder Research Institute, Jhansi (India). Kundu, S. S.; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Jha, Nisha; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division.. Effect of tannin levels and pH on in vitro dry matter degradability and ammonia production from oil seed cake-acacia catechu leaves pellets in cattle inoculums. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 124-130 KEYWORDS: CATTLE. DIGESTIBILITY. IN VITRO EXPERIMENTATION. TANNINS. OILSEED CAKES. COTTONSEED MEAL.

In present study pellets of oil seed cake (groundnut cake-GNC, cotton seed cake-CSC, mustard seed cake-MS, linseed cake-LSC and soybean cake-SBC) and Acacia catechu leaves-ACL (tannin source) with different tannin levels (2–8%) and different pH levels were evaluated for in vitro dry matter degradability (IVDMD) and ammonia production in cattle inoculums. IVDMD of pellets was significantly lower (P0.05) at 2, 4, 6 and 8% tannin levels than control. However, IVDMD at 2% tannin level (54.37%) was more

(P0.05) than at 4, 6 and 8% tannin levels (46.09–48.91%). Highest reduction in IVDMD of pellets was observed for GNC (from 86.68 to 39.48%) and lowest for LSC (from 68.15 to 50.89%) with the addition of tannins. Mean pellets IVDMD was significantly (P0.05) influenced by pH levels and was highest at pH 7 (with 0% tannin 70.50%) and lowest at pH 4 (47.98%). Reduction in pellet IVDMD due to pH was highest from GNC (from 86.68 to 48.89%) and lowest from LSC (from 68.15 to 53.44%). Ammonia production from pellets was significantly higher (P0.05) at 0% tannin level (control) than that of 2, 4, 6 and 8% tannin levels. Tannin reduced mean NH<sub>3</sub> production maximum from SBC pellets (63.17 to 28.47 mg/100 ml) and lowest from CSC (15.60 to 5.80 mg/100 ml). Ammonia production from pellets was more at pH 8 (23.81) than that of pH2 and pH4 (18.02 and 17.00 mg/100 ml), respectively. Results of the in vitro study revealed that all tannin levels reduced pellets IVDMD and NH<sub>3</sub> production.

**290.** Rao, S. B. N.; Central Institute for Research on Goats, Makhdoom (India). Suresh, K. P.; Central Institute for Research on Goats, Makhdoom (India). Tripathi, P.; Central Institute for Research on Goats, Makhdoom (India).. Effect of feeding levels on nutrient utilization and prediction of nutrient requirements for Indian goats. *Indian Journal of Animal Nutrition (India)*. (Jun 2011) v. 28(2) p. 149-152 **KEYWORDS:** GOATS. NUTRITIONAL REQUIREMENTS. NUTRITION PHYSIOLOGY.

Nutrient requirements based on feeding trial on adult male goats (age ~ 2 years, live weight 30.6 kg) in 3 × 3 Latin square switchover design were determined. Group I was fed on a diet to fulfill the maintenance requirement as per NRC (1981), while groups II and III were offered diets with 25 and 50% extra allowance for DM, CP and TDN. The nutrient requirements were determined by multiple regression analysis from feed intake against N balances. The % increase in intake of nutrients (g/kg W<sup>0.75</sup>) over NRC (1981) requirements in groups I, II and III was 6.8, 17.5, 33.1 for DM; 30.6, 52.2 and 76.3 for CP; -0.6, 33.1 and 67.4 for DCP and 15.5, 23.8 and 31.8 for TDN, respectively. As the level of feeding increased the digestibility of DM and CP were increased while those of OM, EE, ADF remained same (P0.05). N-retained (g/d) was significantly higher (P0.05) in group III than in group I. The nutrients requirements for CP, DCP and TDN for group I were 5.67, 3.22 and 38.14, in group II, 7.12, 4.57 and 45.21 and in group III, 8.38, 5.84 and 51.37, respectively at zero N balance when a covariate (CPD) was used in regression analysis (R<sup>2</sup>).

**291.** Nagpal, A.K.; National Research Centre on Camel, Bikaner (India). Roy, A.K.; National Research Centre on Camel, Bikaner (India). Chirania, B.L.; National Research Centre on Camel, Bikaner

(India). Patil, N.V.; National Research Centre on Camel, Bikaner (India).. Growth, nutrient utilization and serum profile in camel calves as affected by dietary protein levels. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 166-171 KEYWORDS: CAMELS. CALVES. PROTEIN CONCENTRATES. FEED CONVERSION EFFICIENCY. NUTRITION PHYSIOLOGY. BLOOD COMPOSITION.

Effect of three dietary protein levels on the nutrient utilization, growth performance and serum profile of camel calves was studied for 367 days. Fourteen healthy male camel calves of Bikaneri, Kutchchi and Jaisalmeri breeds (age 15 months;  $291.00 \pm 7.64$  kg b. wt.) were randomly allotted to 3 groups, 5 calves each in group I and II and 4 in group III and fed isocaloric feed blocks containing 9.50, 12.00 and 14.50% CP. The dry matter intake (DMI) was  $1.48 \pm 0.09$ ,  $1.55 \pm 0.02$  and  $1.38 \pm 0.05$  Kg/100 Kg Bh in groups I, II and III, respectively. Digestibility of DM, OM, EE, and CF did not vary significantly among the groups. CP digestibility increased (P0.05) from group I to groups II and III due to higher dietary protein level. NFE digestibility was decreased (P0.01) from group I to groups II and III due to change in ratio of energy and protein in the diet. Daily DCP intake/kg W<sup>0.75</sup> was similar in groups II and III but significantly (P0.05) higher than in group I, however, TDN intake was statistically similar among the groups. The average growth rates in groups I, II and III were  $0.349 \pm 0.02$ ,  $0.381 \pm 0.02$ , and  $0.392 \pm 0.01$  kg/d, respectively. Feed conversion efficiency (kg DM intake/kg body weight gain) was highest in group III (15.35) followed by group II (15.76) and lowest in group I (16.80), however, variation among groups was not significant. Serum GPT, glucose, total glycerides, cholesterol, total protein, albumin, calcium and phosphorus levels did not vary among the groups, however, variations for GOT and chlorides level were significant (P0.05). It is concluded that camel calves fed on diet containing 14.04% CP and 63.43% TDN exhibited better growth rate and feed conversion efficiency.

**292.** Lailer, P.C.; Central Institute for Research on Buffaloes, Hisar (India). Dahiya, S.S.; Central Institute for Research on Buffaloes, Hisar (India). Lal, D.; Central Institute for Research on Buffaloes, Hisar (India). Chauhan, T.R.; Central Institute for Research on Buffaloes, Hisar (India).. Rumen fermentation pattern in buffaloes fed complete feed blocks.. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 177-180 KEYWORDS: WATER BUFFALOES. COMPLETE FEEDS. RUMEN DIGESTION.

Two rumen fistulated adult male buffaloes were fed individually on three different diets namely wheat and bajra straw based complete feed blocks and conventional diet comprising concentrate mixture, green fodder and wheat straw. The same concentrate mixture was used to make complete feed blocks based on wheat

straw (WSCFB) and bajra straw (BSCFB) having wheat/bajra straw: concentrate in the ratio of 60:40 on fresh basis. Buffaloes in these treatment groups were also offered green fodder as in control group. CP content of concentrate mixture was 18.82% whereas WSCFB and BSCFB contained 8.96 and 9.04%, respectively. The TVFAs concentration increased from conventional diet to the complete feed block diets with a peak concentration at 4 h post feeding. Similarly, pH values were affected by the diets as well as time of sampling. pH values decreased from conventional diet to the complete feed block diets. Total-N and TCA-N concentrations in SRL on complete feed diets were higher than on conventional diet, however, mean NH<sub>3</sub>-N concentration in SRL was higher (P<0.05) in control group than in WSCFB group. It was concluded that feeding of complete feed blocks based on wheat or bajra straw as sources of roughage at 60% level has a comparable effect on N utilization, TVFAs production and ruminal pH.

**293.** Kumar, Vinod; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India). Elangovan, A.V.; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India). Mandal, Asit B.; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India). Tyagi, Praveen K.; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India). Bhanja, S.K.; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India). Dash, B. B.; Pandit Deen Dayal Upadhyay Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura (India).. Effect of DL-methionine supplementation and high tannin red sorghum feeding on nutrient utilization and blood biochemical profile of broilers. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 185-190 KEYWORDS: BROILER CHICKENS. BLOOD COMPOSITION. SORGHUM. FEED GRASSES. METHIONINE. ESSENTIAL AMINO ACIDS. SUPPLEMENTS. NUTRITION PHYSIOLOGY.

An experiment was conducted to assess the effect of methionine supplementation on the utilization of red sorghum (RS, 2.3% tannin) in the diets of coloured broiler chickens. Day-old chicks (n=360) were randomly divided into 36 groups of 10 chicks each, and 9 dietary treatments were replicated to 4 groups in a completely randomized design. The dietary treatments were; corn-soy-based control diet (D1) and the diets consisted of four levels (25, 50, 75 and 100% part of maize) of red sorghum (RS-RS) or 25 100 respective levels of red sorghum supplemented with methionine (0.04, 0.08, 0.12 and 0.16% in RS25Met-RS100Met, respectively). All the diets were iso-

nitrogenous and iso-caloric (2800 kcal ME/kg) with similar lysine (1.14 and 1%) and methionine (0.45 and 0.40%) during 0–3 wk and 4–6 wk of age, respectively. The nutrient utilization was similar in all the dietary groups. The footpad index of birds fed red sorghum was higher ( $P < 0.01$ ) than the control group. Similarly, humoral response was better in red sorghum groups than those supplemented with methionine. The blood biochemical profile was not affected by the dietary treatments. Mild histopathological changes were observed in liver and kidney tissues of red sorghum without methionine supplementation. It may be concluded that red sorghum based diet may enhance humoral and cell mediated immune response and addition of methionine can alleviate toxic affect of dietary tannins in broilers and addition of fat in red sorghum based diet at high replacement level of maize improved nutrients utilization.

### **L52 Animal physiology - Growth and development**

**294.** Kharde, S.D.; MAFSU, Nagpur Veterinary College, Nagpur (India). Department of Veterinary Physiology. Shirbhate, R.N.; MAFSU, Nagpur Veterinary College, Nagpur (India). Department of Veterinary Physiology. Bahiram, K.B.; MAFSU, Nagpur Veterinary College, Nagpur (India). Department of Veterinary Physiology. Nipane, S.F.; MAFSU, Nagpur Veterinary College, Nagpur (India). Department of Veterinary Physiology.. Effect of Spirulina supplementation on growth performance of broilers. Indian Journal of Veterinary Research (India). (Jan-Jun 2012) v. 21(1) p.66-69 KEYWORDS: BROILER CHICKENS. FEED CONVERSION EFFICIENCY. GROWTH. SPIRULINA.

The experimental trial of six weeks was undertaken on 90 broiler chicks divided into three groups. Control (To) group was fed standard broiler diet and T1 and T2 groups were provided same broiler diet supplemented with 300 and 500 mg of Spirulina per kg feed, respectively. Mean live body weight of six weeks of the experiment and live weight at the end of experiment were found to be significantly ( $P < 0.05$ ) higher in Spirulina supplemented T1 and T2 groups of broilers than that of control (To) group. Comparatively better mean weekly weight gain and feed efficiency were also observed in Spirulina supplemented groups (T1 and T2) with decreased feed consumption as compared to control (To) group of broilers.

**295.** Sharma, Kamal; Assam Agricultural University, Guwahati (India). Kalita, S.N.; Assam Agricultural University, Guwahati (India). Sarma, M.; Assam Agricultural University, Guwahati (India). Devi, J.; Assam Agricultural University, Guwahati (India).. Postnatal development of the caput epididymis in Assam goat (*Capra hircus*). Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 932-934 KEYWORDS:

GOATS. PERINATAL PERIOD. TESTES. BIOMETRY. ASSAM.

The present work has been aimed to elucidate the age-wise post natal development of the testis, epididymis and thyroid gland of Assam goats from 0 day to 10 months of age. Assam (18) goats were divided into six age groups (N, 3; in each group) viz. group 1 (0-day), group 2 (2 months), group 3 (4 months), group 4 (6 months), group 5 (8 months) and group 6 (10 months). The gross and biometrical parameters of the caput epididymis were recorded. The tissues fixed from this organ were utilized for micrometrical studies. The values of majority of the biometrical parameters of caput, viz. length, width, thickness and weight showed a highly significant variation between different age groups. Bilateral variations of these parameters were also noticed between right and left counterparts of this organ. The diameter of the epididymal tubules, height of tubular epithelium and height of the stereo cilia in caput epididymides showed a significant increase with advancing age of the male Assam goats.

### **L53 Animal physiology - Reproduction**

**296.** Rajalekshmi, M.; Kemin Industries South Asia Pvt Ltd, Chennai (India) Ravichandran, M.; Kemin Industries South Asia Pvt Ltd, Chennai (India) Sripathy, R.; Kemin Industries South Asia Pvt Ltd, Chennai (India) Chirakkal, H.; Kemin Industries South Asia Pvt Ltd, Chennai (India) Rajendran, D.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Organic Chromium Supplementation Modulates the Serum Corticosterone Response to Heat Stress in Wistar Albino Rats. *Animal Nutrition and Feed Technology (India)*. (Sep 2012) v. 12(3) p. 363-371 **KEYWORDS:** RATS. CHROMIUM. SUPPLEMENTS. HEAT STRESS.

The effect of organic chromium supplementation on serum corticosterone levels in rats exposed to heat stress was investigated. The study was conducted in 8-10 week old male Wistar albino rats, which were supplemented with chromium propionate (300 ppb) for 14 days and subjected to heat stress on day 1, 7 and 14. The study groups included an unstressed control (C), stressed control without any supplementation (Negative control, NC) and a stressed group (T) supplemented with organic chromium, in the form of chromium propionate (dosage equivalent to 300 ppb elemental chromium). Chromium supplementation reduced the response to intermittent heat stress, as shown by lower ( $P < 0.05$ ) serum corticosterone levels in the treated, stressed group as compared to the untreated, stressed negative control group. No significant effect on body weight gain, or feed and water consumption were observed in any groups. Exposure to stress did not increase ( $P > 0.05$ ) the glucose levels in the chromium supplemented group, whereas the glucose levels in the untreated, stressed negative control group tended to be higher

(P<sub>0</sub>.10) as compared to untreated, unstressed control. The study brings out the beneficial effects of supplementation of chromium, reducing the stress response and improving glucose utilization in rats.

**297.** Jain, Asit; National Dairy Research Institute, Karnal (India). Dairy Cattle Nutrition Division. Jain, Tripti; National Dairy Research Institute, Karnal (India). Animal Biotechnology Centre. Mitra, Abhijit; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Genetics.. Expression and Immunohistochemical Localization of Ghrelin Gene in Buffalo (*Bubalus Bubalis*) Corpus Luteum. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 61-65  
KEYWORDS: WATER BUFFALOES. CORPUS LUTEUM. GLUTATHIONE.

Ghrelin, a novel motilin related 28-amino acid peptide, is an endogenous ligand for GH secretagogue receptor (GHS-R). In addition to its neuro-endocrine effects in the control of growth hormone (GH) secretion and food intake, recently an unexpected reproductive facet of ghrelin has emerged as its expression and cognate receptors are reported in the rat testis. However, the presence of this signaling system is yet to be ascertained in the buffalo gonads. In this study, amplified 230 bp of ghrelin gene from buffalo corpus luteum (CL) using cDNA as a template have been taken. Also, by immunohistochemistry using specific polyclonal antibodies, the presence and localization of ghrelin in the cyclic and pregnant CL were assessed. Expression of ghrelin protein was persistent local observed in the estrous cycle and early pregnancy (~d40). However, the signals of ghrelin protein were found to be higher during early pregnancy compared to estrous cycle. These dynamic changes in the expression profile of ghrelin during the estrous cycle and throughout the pregnancy propose a precise regulation of ovarian expression of ghrelin, which could portray the potential role of ghrelin in regulation of luteal development. In conclusion our study is the first to demonstrate the expression of ghrelin in the cyclic and pregnant buffalo CL which opens up the possibility of using this molecule in regulating the reproduction.

**298.** Borah, S.; Assam Agricultural University, Guwahati (India). College of veterinary Science. Chakravorty, P.; Assam Agricultural University, Guwahati (India). College of veterinary Science. Sarmah, B.C.; Assam Agricultural University, Guwahati (India). College of veterinary Science. Bhuyan, S.; Assam Agricultural University, Guwahati (India). College of veterinary Science. Deka B.C.; Assam Agricultural University, Guwahati (India). College of veterinary Science. Correlation of Serum Progesterone Concentration with Number of Corpora Lutea in Superovulated Assam Local and Beetal Goats. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1)

p. 98-99 KEYWORDS: GOATS. SUPEROVULATION. CORPUS LUTEUM HORMONES. PMSG.

An experiment was conducted in five numbers of 2 – 3 years old healthy parous Assam local (AL) does, and another five numbers of Beetal (B) does of similar status to study the correlation of serum progesterone concentration with number of corpora lutea in superovulated goats. The goats were superovulated with Folligon (PMSG) and Chorulon (HCG) at the dose rate of 750 and 1500 I.U., respectively, with 2 ml of Iliren. In Assam local goats the numbers of corpora lutea (CL) significantly more ( $P < 0.01$ ) than that of Beetal goats ( $12.80 \pm 0.37$  Vs  $9.4 \pm 1.46$ ), however, the Beetal goats had significantly ( $P < 0.01$ ) more numbers of matured follicles ( $10.00 \pm 2.21$ ) than Assam Local goats ( $4.4 \pm 0.68$ ). Serum progesterone concentration assayed following COAT-A-COUNT method of Radio Immuno Assay revealed positive correlation with total number of CL both in Assam Local and Beetal goats with significant positive correlation.

**299.** Ingole, S D; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Deshmukh, B.T.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Nagvekar, A.S.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Bharucha, S.V.; Maharashtra Animal and Fishery Sciences University, Nagpur (India).. Endocrine profile from birth to puberty in buffalo calves and heifers. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 563-569 KEYWORDS: HEIFERS. ENDOCRINOLOGY. SEXUAL MATURITY.

The GH, FSH and LH were studied in female buffalo calves from birth to puberty and the endocrine profiles recorded at different stages of growth in female buffalo calves and heifers were compared. The minor fluctuation of GH upto 8–10 months of age may be due to gradual dilution of GH with increasing age and size of animals. The decreased GH concentrations at 21–24 months and 24–30 months is due to the endocrine changes that occur at puberty which is associated with a decrease in the number of GH binding sites and consequently the decline in serum circulation of GH. The FSH concentration did not differ significantly from birth to 15–18 months of age indicating that the cessation of early rise may be due to the establishment or enhancement of negative feedback regulation of gonadotrophin secretion by ovarian products. The higher levels of serum FSH from 18–21 months of age to 24–30 months of age could be indicative of the fact that the buffalo calves may have attained puberty. The higher levels of LH found after birth in buffalo calves might be presumably in response to the withdrawal of placental estrogen followed by a brisk surge of gonadotrophins. The gradual increase of gonadotrophin may be possibly due to

gradual decrease in sensitivity to ovarian steroid inhibitory feedback, while decrease may be due to rise in sensitivity of GnRh secretion to the inhibitory effects of ovarian steroids. The highest concentration observed at 15–18 months suggests that a prepubertal increase in circulating LH concentration is the critical event leading to onset of puberty. Thus, the high concentration of LH prior to puberty onset may be an important event in the trigger for initiation and organization of cyclic ovarian activity in buffalo heifers.

**300.** Bonia, K.K.; Assam Agricultural University, Guwahati (India). Goswami, J.; Assam Agricultural University, Guwahati (India).. Serum 17 oestradiol, progesterone and cortisol level during biological stress period of normal and sub-oestrous cycles of crossbred cattle of Asom. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 676-678 KEYWORDS: CATTLE. CROSSBREDS. STRESS. OESTROUS CYCLE. BIOLOGICAL RHYTHMS. PROGESTERONE. OESTROGENS.

The study was planned to compare serum 17 oestradiol, progesterone and cortisol level during biological stress period of normal and sub-oestrous cycles of crossbred cattle of Asom. Jugular blood samples were collected from ten normal cyclic and ten sub-oestrous cows on day 0, 5, 10, 15 and 20 of cycles for the present study. These 3 hormones were estimated by using radioimmunoassay technique. Both 17 oestradiol and progesterone concentrations in serum were varied significantly (P0.01) between days of oestrous cycles of normal and sub-oestrous conditions. But these levels were not varied significantly between the two types of cyclic cows of the investigation where lowest level of progesterone with concomitant highest level of 17 oestradiol were recorded on the day of oestrus. On the other hand, highest concentration of progesterone with lowest concentration of 17 oestradiol was found on the day 15 of cycles of the both groups. The mean levels of cortisol varied significantly between days of cycles with highest level on the day of oestrus with no significant variation 2 groups of cows.

**301.** Verma, V.; Indian Veterinary Research Institute, Palampur (India). Gautam, S.K.; Indian Veterinary Research Institute, Palampur (India). Singh, B.; Indian Veterinary Research Institute, Palampur (India). Kumar, M.; Indian Veterinary Research Institute, Palampur (India). Chauhan, M.S.; Indian Veterinary Research Institute, Palampur (India). Development of water buffalo (*Bubalus bubalis*) embryos after parthenogenetic activation of oocytes with calcium ionophore, ethanol and 6-dimethylaminopurine. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 679-682 KEYWORDS: PARTHENOGENESIS. WATER BUFFALOES. ANIMAL EMBRYOS. IONOPHORES.

The present study was carried out to investigate the effects of various activation treatments on the parthenogenetic development of buffalo oocytes and their comparison with the IVF embryos and to investigate the mean total cell number per blastocysts produced. The rates of cleavage and blastocyst development were significantly higher when the oocytes were activated by combined treatment of calcium ionophore (A23187) and ethanol, followed by 6dimethylaminopurine (6-DMAP) than those activated by individual treatments with these chemicals, as well as blastocysts produced through IVF. Our results showed significant difference in the number of blastomeres between parthenotes and IVF buffalo embryos. Our results can be used to establish effective protocols for activation of buffalo oocytes and development of embryos which can be used to study mechanisms involved in the initiation of the embryonic development, and derivation of embryonic stem (ES) cells for various applications.

**302.** Caesar, N.K.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India). Shukla, S.N; Government Veterinary Hospital, Jabalpur (India). Shrivastava, O.P.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India). Agrawal, R.G.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India). Agrawal, S.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India).. Fertility response to modified progesterone based synchronization protocol in true anoestrus buffaloes (*Bubalus bubalis*). Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 683-686 **KEYWORDS:** WATER BUFFALOES. OESTROUS CYCLE. PROGESTERONE.

Present study was conducted on 42 true anoestrus buffaloes to observe the efficacy of controlled internal drug release (CIDR) implant alone and in combination with pregnant mare serum gonadotropin (PMSG) and Estradiol valerate for induction of estrus and fertility response. All experimental animals were randomly divided into 6 groups of 7 animals each. All the animals were administered 20 ml liquid Terramycin intra uterine except in G1 and G3. Animals of G1 and G2 were served as control where as in G3, G4, G5 and G6 implanted with CIDR. Animals of G5 were administered 1 mg estradiol and G6 with 500 IU PMSG on the day of implant withdrawal. The serum progesterone and estrogen profiles were also studied before treatment, at estrus and 10th day post estrus. On removal of implant all the animals of G5 and G6 exhibited estrus within  $30.42 \pm 5.10$  and  $65.14 \pm 11.39$  h with 57.1 and 85.7% conception rate, respectively. However, in the animals of G4 and G3 induction rate was 85.7 and 71.4% within  $40.08 \pm 2.09$  and  $72.00 \pm 10.76$  h of onset interval with 66.6% and 0.00% conception rate, respectively. None of the animals of G1 and G2 induced in

estrus. Serum progesterone (P 4) and estradiol (E ) profiles confirmed our findings of rectal palpation. Study indicates that addition of PMSG to a progesterone based estrus synchronization regimen substantially improves ovulation rate and fertility in non cyclic buffaloes.

**303.** Mishra, Chinmoy; Indian Veterinary Research Institute, Izatnagar (India). Das, Dharmeswar; Indian Veterinary Research Institute, Izatnagar (India). Pushpendra Kumar; Indian Veterinary Research Institute, Izatnagar (India). Sharma, Arjava; Indian Veterinary Research Institute, Izatnagar (India).. PCR-RFLP and nucleotide sequencing of mx1 gene in chicken. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 718-722 KEYWORDS: BROILER CHICKENS. PCR. POLYMORPHISM. RFLP.

Mx1 gene is an interferon induced gene which inhibits the proliferation of single stranded RNA viruses including influenza virus. Single nucleotide polymorphism in the Mx1 gene was reported to be associated with resistance to influenza virus. However, the indigenous breeds of India are not screened for Mx1 gene previously. In the present investigation partial intron 13 and partial exon 14 of Mx1 gene was studied using PCR-RFLP technique in 153 Aseel breed of chicken. A 100 bp PCR amplified products were digested with Rsa I restriction enzyme which revealed 2 genotypes (RS and SS) and 2 different alleles (R and S). The RR genotype could not be found in this population. The genotype frequency was 0.655 and 0.345 for RS and SS genotypes and 0.33 and 0.67 for R and S alleles, respectively. PCR product of both the alleles were sequenced and submitted to NCBI GenBank data. The analysis of sequence data by DNASTAR programme revealed differences at one (72nd) position in 100 bp fragment. There is an urgent need of wide search for detection of polymorphism in Mx1 gene of chicken and its possible association with the traits of economic importance.

**304.** Reddy, I.J.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). David, C.G.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Ravi Kiran, G.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Mondal, S.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Pulsatile secretion of luteinizing hormone and GnRH and its relation to pause days and egg production in hens exposed to different wavelengths of light. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 919-923 KEYWORDS: HENS. LH. GNRH. LAYING PERFORMANCE. LIGHT REGIMES.

The study aimed to establish the effects of red spectrum of light (650nm; treated n, 12) and normal spectrum of light (450nm control,

n=12) on GnRH concentration, amplitude and frequency of luteinizing hormone (LH), estradiol (E2 $\beta$ ), progesterone (P4), intersequence pause days and egg production from 62 to 72 weeks old laying White Leghorn hens. Weekly interval profiles of plasma GnRH, LH, E2 $\beta$  and P4 concentrations were increased in birds exposed to red spectrum of light. At 67th weeks of age blood samples from both the groups were collected at every 3 h for 36 h to study the pulsatile secretion of LH surges. Plasma LH concentration was higher in treated birds with more number of frequencies and amplitude of LH surges in plasma of treated birds. The LH frequencies were more pronounced and advanced during 36 h of sampling at 3 h interval in treated birds. Weekly interval of plasma LH, E2 $\beta$  and P4 concentrations increased in treated birds from 62 to 72 weeks of age. GnRH concentration was significantly higher in birds exposed to red spectrum of light compared to controls. It is hypothesized that exposure of birds to red spectrum of light caused enhanced GnRH along with LH, E2 $\beta$  and P4 hormones required for egg formation and egg lay. During 77 days (62–72 weeks of age) of experimental period, egg production was enhanced with lower incidence of pause days even during the later stages of productive period in treated group. In conclusion, higher levels of GnRH, LH, and E2 $\beta$  and P4 concentration with lower incidence of pause days enabled the birds to lay more eggs even later in the productive period by modulating the wavelengths of light under normal husbandry conditions.

**305.** Pathak, Devendra; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Bansal, Neelam; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. A transmission electron microscopic study on the buffalo oviduct during follicular and luteal phases of estrous cycle. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 928-931 KEYWORDS: WATER BUFFALOES. OVIDUCTS. OESTROUS CYCLE. MICROSCOPY.

The present investigation was conducted on different segments of both the oviducts from buffaloes (12) during follicular and luteal phases of estrous cycle. It was lined by two distinct types of columnar cells, viz. ciliated and secretory cells. The numbers of ciliated and secretory cells varied in different segments and phases of estrous cycle. Ciliated cells were more observed in infundibulum and ampulla as compared to isthmus. The nuclei of these cells were elongated and usually centrally or basally located. Secretory cells with the cytoplasmic protrusions extending beyond the luminal border of the secretory cells were observed in higher number in the follicular phase of estrous cycle. In the secretory cells, some secretory granules were present in the supranuclear cytoplasm. The secretory granules had homogenous electron-dense matrices. The

non-ciliated secretory cells of the isthmus had few secretory granules, but contained many lysosome like bodies. Secretory cells at follicular phase were characterized by numerous secretory granules showing maximum differentiation and a well developed rough endoplasmic reticulum with dilated cistern. During the luteal phase the ciliation was less and amount of secretory activity also reduced as compared to that of follicular phase.

**306.** Shelke, S.K.; National Dairy Research Institute, Karnal (India). Thakur, S.S.; National Dairy Research Institute, Karnal (India). Amrutkar, S.A.; National Dairy Research Institute, Karnal (India).. Effect of pre partum supplementation of rumen protected fat and protein on the performance of Murrah buffaloes. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 946-950 KEYWORDS: WATER BUFFALOES. PARTURITION. REPRODUCTIVE PERFORMANCE.

The present experiment was conducted to study the effect of pre partum rumen protected fat and protein supplementation on the performance of Murrah buffaloes. Eighteen Murrah buffaloes (2<sup>nd</sup> -4<sup>th</sup> lactation) were divided into 2 groups (9 each) on the basis of most probable production ability (MPPA). Buffaloes in group 1 (control group; MPPA 2204.17 kg) were fed chaffed wheat straw, chopped green maize fodder and concentrate mixture as per requirements; buffaloes in group 2 (treatment group; MPPA 2210.64 kg) were fed same ration as control group plus 2.5% rumen protected fat (on DM intake basis) and concentrate mixture containing formaldehyde treated mustard and groundnut oil cake (1.2 g HCHO/100 g CP) in place of normal mustard and groundnut oil cakes. Group 2 buffaloes were supplemented rumen protected fat and protein 60 days pre partum. Average DM intake was 11.13 and 11.69 (kg/d) in groups 1 and 2, respectively, which was significantly higher in group 2. The average CP and TDN intakes were higher in group 2 than that of group 1. During last fortnight, group 2 buffaloes showed higher body weight gain than that of group 1. Average birth weights of the calves were higher by 10.8% in group 2 (35.38 kg) than that of group 1 (31.94 kg). The calving percentage was 100% in both groups. There was no effect on plasma glucose, NEFA, triglycerides and cholesterol concentrations among 2 groups, whereas BUN concentration was lower in group 2 during. Incidence of retention of foetal membranes, still births and premature births were reduced in group 2 buffaloes. It may be concluded that rumen protected fat and protein supplementation during pre partum period to advanced pregnant buffaloes increased the calf weight, decreased the incidences of retention of foetal membranes and premature birth in high yielding buffaloes.

**307.** Pandey, Sudhir Kumar; Sher-e-Kashmir University of Agricultural

Science and Technology, Jammu (India). Anil Kumar; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Razzaque, Waquar Ahmed Abdul; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Dwivedi, Dinesh Kumar; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India).. Importance of micro minerals in reproductive performance of livestock. Veterinary World (India). (May 2011) v.4(5) p. 230-233 KEYWORDS: LIVESTOCK. REPRODUCTIVE PERFORMANCE. MINERAL NUTRIENTS. SUPPLEMENTS.

Micro minerals have a great impact on animal's reproductive physiology and its imbalance causes various problems leading to lowered reproductive efficiency and resultant monetary loss to the dairy industry. Adequate micro minerals supplementation is required as most of the roughages, greens, concentrates and even most of commercial feeds available to Indian market are deficient in trace mineral elements. Often correcting an imbalance in mineral levels can solve a nagging problem by improving reproductive performance and health with little additional cost. As terrain and agro climatic area of India is quite diverse, so one therapeutic treatment may not be suitable for other regions. Hence there is a need to map of the various nutrient status in soil, fodder and animal, so that accordingly an area specific mineral may be supplemented.

**308.** Tokas, J.; CCS Haryana Agricultural University, Hisar (India). Mukhopadhyay, C. S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Verma, Archana; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division.. Self Renewal of Spermatogonial Stem Cells: the Most Promising Multipotent Cells - A Review. Veterinary World (India). (May 2011) v.4(5) p. 234-240 KEYWORDS: SPERMATOGENESIS. TESTES. GENITALIA.

Germ cells are endowed with unique properties like the ability to undergo meiosis and differentiate into gametes in order to perpetuate the genetic material. Spermatogonial stem cells (SSC) are considered as the best suited undifferentiated germ cells and are being consistently studied to reveal the basic physiology, genomics and transcriptomics of those cells. SSC provide an excellent model system to understand the differentiation, development and functioning of gonads and further use of these cells in transplantation-cell based therapies. In the present article, basic aspects of spermatogonial multiplication, regulation of stem cell renewal and differentiation would be discussed.

**309.** Narayan, Sowmya; Karnataka Veterinary, Animal and Fisheries Sciences University, Hebbal (India). Narayana Swamy, M.; Karnataka

Veterinary, Animal and Fisheries Sciences University, Hebbal (India).  
Veena, T.; Karnataka Veterinary, Animal and Fisheries Sciences  
University, Hebbal (India).. Ovarian antral follicular dynamics in  
Ankamali Pigs. Veterinary World (India). (Jun 2011) v.4(6) p. 264-265  
KEYWORDS: SWINE. OVARIAN FOLLICLES. KARNATAKA.

The present study was designed with the objective of understanding the ovarian antral follicular dynamics in Ankamali pigs, an indigenous south Indian breed of pig, that derives its name from Ankamali block in the Ernakulam district of Kerala, also found in Karnataka, Tamil Nadu, parts of Maharashtra and Andhra Pradesh. For the present study, the ovaries were collected from apparently healthy, non pregnant, cyclic and middle aged (2 to 5 years) Ankamali pigs slaughtered at civil meat processing and production centre, Frazer town, Bangalore during the month of February to May 2010. The February month was transition month from winter to summer and the month of March, April and May were considered as summer months. A total of 640 ovaries were collected and the surface antral follicles on the ovaries were classified into Group I (small, 3 mm), Group II (medium, 3-6.9 mm) and Group III follicles (large, 7-12 mm) on the basis of their diameter. The results of the present study revealed that the number of Group I follicles were significantly (P0.05) higher compared to Group II and Group III follicles. Similarly, Group II follicles were significantly (P0.05) higher compared to Group III follicles during different months of observation. An attempt was also made in the present study to find out the approximate ratio between the small, medium and large follicles wherein it was 7: 4:1 during the month of February and March and it was 6: 5: 1 during the month of April and May. The ovarian follicular dynamics established in the present study during winter to summer transition month like February and during summer months like March, April and May shall throw some insights into the ovarian physiology in Ankamali breed of pig.

**310.** Das, G.K.; Indian Veterinary Research Institute, Izatnagar (India).  
Khan, F.A.; University of Wisconsin-Madison (U.S.A.) Pande, Megha;  
Indian Veterinary Research Institute, Izatnagar (India).. Pregnancy  
Diagnosis in Small Ruminants. Indian Journal of Small Ruminants  
(India). (Apr 2011) v. 17(1) p. 21-31 KEYWORDS: SHEEP. GOATS.  
PREGNANCY DIAGNOSIS.

Small ruminants form an integral part of rural economy especially in the arid, semi-arid and hilly regions of the country through milk, meat, wool and skin besides serving as a source of sustenance to small and marginal farmers. Like others species, productive potential of small ruminants is greatly affected by reproductive management. An early diagnosis of pregnancy is needed for improving reproductive efficiency and maintaining cost-effective production. A

wide variety of methods have been employed for pregnancy diagnosis in these animals. Some are applicable at the field or farm level while others are restricted to the laboratory only. Pregnancy diagnosis procedures based on laparoscopy, laparotomy, vaginal cytology and radiography although reliable are limited to the laboratory because of infrastructure and cost involvement. Non-return to estrus is still the easiest and cheapest method applicable at field and farm level. Techniques like detection of pregnancy associated glycoproteins and real-time B-mode ultrasonography have a high degree of accuracy and are, thus, likely to be more commonly used in future. The present overview gives a comparative evaluation of different procedures of pregnancy diagnosis in small ruminants.

### **L70 Veterinary science and hygiene**

**311.** Sumathi, K; District Livestock Farm, Abhishek patti(India). Harikrishnan, T.J.; Tamil Nadu Veterinary and Animal Sciences University, Namakkal(India). Veterinary College and Research Institute, Department of Veterinary Parasitology. Anna, T; Tamil Nadu Veterinary and Animal Sciences University, Chennai(India). Department of Veterinary Parasitology.. Laboratory studies on *Musca domestica* (diptera: Muscidae) and its pupal parasitoid, *Dirhinus himalayanus* (hymenoptera: Chalcidoidea). Indian Journal of Entomology (India). (June 2013) v.75(2)p.99-103 KEYWORDS: MUSCA DOMESTICA. PARASITOID. HYMENOPTERA.

Laboratory experiments on density relationships, host age and progeny emergence were conducted on *Dirhinus himalayanus* (Hymenoptera: Chalcidoidea), a solitary pupal parasitoid of flies including *Musca domestica* (Diptera: Muscidae). The effect of parasitoid and pupal host densities were determined for 24 h using parasitoid host ratios ranging from 1: 2 to 1: 20. When the number of parasitoids was held constant ( $n=1$ ) and the number of pupal hosts varied, the parasitism % did not increase with increasing pupal host density. Maximum parasitoid emergence ( $25\pm 1$ ) was observed at 1: 4 ratio as against  $6.66\pm 0.51$  at 1: 10 parasitoid host ratios at 21°C to 24°C. When the number of pupal hosts was held constant and the no. of parasitoids varied, the pupae parasitized increased with parasitoid density The mean number of pupae parasitized was higher at 1: 20 ( $33.67\pm 5.13$ ) than at 1: 3 ( $2.67\pm 0.58$ ) at 21°C to 24°C. Fly emergence decreased uniformly with increase in the host parasitoid ratio at 21°C to 24°C. No difference was recorded in the mean number of pupae parasitized when 24 h and 48 h pupae were exposed to *D. himalayanus* at 1: 10 parasitoid host ratio. The mean number of progeny produced by a virgin female in a day was  $3.2 \pm 0.6$  and the age of the ovipositing virgin female significantly affected

the progeny emergence ( $3.2 \pm 0.6$ ) ( $P < 0.05$ ). The mean number of the progeny produced by a mated female *D. himalayanus* was  $3.6 \pm 0.6$  and the age of the mated female did not significantly affect the mean number of progeny emergence ( $3.6 \pm 0.6$ ) ( $P < 0.05$ ). Progeny production between virgin females and mated females did not differ significantly ( $P < 0.05$ ). Virgin females lived for 8 days at 21°C to 24°C but in the company of males, the longevity was increased to 10 days.

**312.** Samal, Lipismita; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Chaturvedi, V.B.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Saxena, S.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Baliyan, Meeta; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition. Pattanaik, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in animal Nutrition.. Jerusalem Artichoke as a Potential Prebiotic: Influence on Nutrient Utilization, Hindgut Fermentation and Immune Response of Labrador Dogs. *Animal Nutrition and Feed Technology (India)*. (Sep 2012) v. 12(3) p. 343-352 **KEYWORDS:** DOGS. JERUSALEM ARTICHOKES. NUTRITION PHYSIOLOGY. IMMUNE RESPONSE.

In order to explore the potential of Jerusalem artichoke (JA) as a prebiotic, four groups (CON, PRE-1, PRE-2 and PRE-3) of adult Labrador dogs ( $n=4$  in each) were fed for 90d on a basal diet supplemented with pulverized JA tuber at 0, 1, 2 and 3% levels, respectively. Cell-mediated immunity was assessed on d56 by measuring skin indurations following intra-dermal phytohaemagglutinin-P inoculation. At d60, peripheral lymphocyte sub-populations in blood were assessed by flow cytometry. Humoral immunity was assessed by quantifying the antibody titre against sheep-RBC (SRBC). A digestion trial of 6d duration was conducted after 80d of feeding. Results revealed an increase ( $P=0.016$ ) in skin indurations in PRE1 and PRE-2 compared to CON and PRE-3. There was no impact of JA on circulating peripheral CD3+ and CD8+ populations, however, CD4+ populations enhanced ( $P=0.005$ ) in JA supplemented groups than CON. The antibody titre ( $\log_2$ ) against SRBC was also higher ( $P=0.007$ ) in treatment groups than control. There was an increase ( $P < 0.05$ ) in faecal concentration of lactate and short-chain fatty acids with a concomitant reduction in ammonia. The faecal counts ( $\log_{10}$  cfu/g) of health-positive *Bifidobacterium* ( $P=0.035$ ) and *Lactobacillus* ( $P=0.062$ ) were higher in treatment groups while health-negative coliforms and *Clostridium* counts remained unaltered. The digestion trial indicated that JA supplementation improved the digestibility of fibre ( $P=0.003$ ) along

with that of calcium and phosphorus. Overall findings revealed that JA may constitute a perspective prebiotic additive because of its apparent positive impacts on immune status as well as hindgut fermentation.

**313.** Jonathan, Lalsiamthara; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). College of Veterinary Science. Arora, Anil Kumar; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). College of Veterinary Science.. Comparison of Detection Threshold of Different Pasteurella Multocida Specific PCRS. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 28-33 KEYWORDS: PASTEURELLA MULTOCIDA. PCR.

The present study was undertaken to determine the detection threshold of five different Pasteurella multocida PCRs using a standard vaccine strain P52 as DNA template. The purified genomic DNA was diluted ten-fold serially and then subject to polymerase chain reaction. Among the primers assessed, IPFWD or IPREV primers showed the highest sensitivity, detecting purified DNA at 5 fg concentration (~2 bacterial cells). KMT1T7 & KMT1SP6, KTSP61 & KTT72 and PSL-(forward & reverse) primers could detect P52 DNA at the levels of 500, 50 and 50 pg respectively. PM23F1 & PM23R2 primers were the least sensitive and could detect P52 DNA at 5 ng concentration only.

**314.** Veena, M.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar (India). Veterinary College. Centre of Advanced Faculty TrainingD'Souza, Placid. E.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar (India). Veterinary College. Centre of Advanced Faculty TrainingMurthy, G. S. Sreenivasa; Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar (India). Veterinary College. Centre of Advanced Faculty Training Prasad, C. Renuka; Institute of Animal Health & Veterinary Biologicals, Bangalore (India). Serodiagnosis of Cryptosporidiosis in Cattle by IFAT. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 70-73 KEYWORDS: CRYPTOSPORIDIUM. IMMUNODIAGNOSIS. VIROSES. IMMUNOFLUORESCENCE.

The indirect fluorescent antibody technique was standardised for serodiagnosis of Cryptosporidiosis in naturally infected cattle. A total of 201 faecal and serum samples were collected from different farms, animal shelters and abattoirs in and around Bangalore which included 11 samples positive for Cryptosporidium infection on faecal microscopy. Two species viz., Cryptosporidium parvum and Cryptosporidium andersoni were prevalent based on faecal examination. Oocysts were purified by using sedimentation and gradient centrifugation and then the samples were screened by

immunofluorescence antibody technique (IFAT). Out of 201 sera samples 25 samples were positive for Cryptosporidial antibodies indicating an infection rate of 12.44%.

**315.** Usha, N.P.; College of Veterinary and Animal Sciences, Thrissur (India). Bibu, Jose,; College of Veterinary and Animal Sciences, Thrissur (India). Jose, P. Subin; College of Veterinary and Animal Sciences, Thrissur (India). Jayakumar, K.M.; College of Veterinary and Animal Sciences, Thrissur (India). Nair, A.M.C.; College of Veterinary and Animal Sciences, Thrissur (India). Nair, G. Krishnan; College of Veterinary and Animal Sciences, Thrissur (India). Nair, N.D.; College of Veterinary and Animal Sciences, Thrissur (India). In vitro Antipasteurellosis Activity of Different Extracts of Polyalthia Longifolia Leaves. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 82-85 KEYWORDS: PASTEURELLA MULTOCIDA. PASTEURELLOSIS.

The outbreaks of duck pasteurellosis which occur during monsoon period, caused by avian strains of *Pasteurella multocida*, is a serious problem with high mortality and morbidity affecting younger age groups. *Polyalthia longifolia* (*P. longifolia*) leaves which had antibacterial action, was tested for its efficacy against *P. multocida* by in vitro methods. The successive extracts of the plant materials were tested for its antibacterial effect using microtitre plate technique (to estimate the minimum inhibitory concentration, MIC) and disc diffusion method was performed to estimate the zone of inhibition. Microtitre plate technique was assayed by dissolving the plant extracts in sterile DMSO except the aqueous extracts which were dissolved in sterile distilled water. Various concentrations, 200 µg, 500 µg and 1 mg/well, of successive extracts of *P. longifolia* were used to find out the MIC. Disc diffusion method was performed with successive extracts of *P. longifolia* leaves at 200 µg, 500 µg and 1 mg concentrations. The results from the above in vitro assay revealed the efficacy of acetonic extract of *P. longifolia* leaves against duck pasteurellosis. The acetonic extract was further subjected to spectrophotometric, thin layer chromatography and high performance thin layer chromatographic analysis. The results of the present study could describe the antipasteurellosis activity of *P. longifolia* leaves.

**316.** Jattennavar, P.S.; Veterinary Hospital, Gadag (India). Kalmath, G.P.; Veterinary College, Bangalore (India) Department of Veterinary Physiology,. Urethral Obstruction by Urinary Calculi in a Pomeranian Dog. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 100-102 KEYWORDS: DOGS. URINARY TRACT DISEASES. UROLITHIASIS.

One and half year old male Pomeranian dog was presented to the veterinary hospital, Gadag, with the complaint of tenesmus, uneasiness, passing scanty urine, severe straining during urination and passing of blood mixed urine at the end of the urination for the past 5 days and anuria for the past 24 hours. Upon clinical examination, animal was dull, showing symptoms of abdominal pain and dehydration. Temperature was sub normal and respiratory and pulse rate were elevated. Ventral abdominal palpation along the course of penis revealed a hard granular mass just posterior to the os penis. When the attempts to dislodge calculus in to the urinary bladder failed, the animal was operated under atropine sulphate and thiopentone sodium to remove a round 6 mm calculus. Post surgical treatment with antibiotics and daily dressing of the surgical for a week ensured recovery of animal and re-establishment of urine flow.

**317.** Barua, C.C.; Assam Agricultural University, Guwahati (India). College of Veterinary Science, Department of Pharmacology & Toxicology. Begum, S.A.; Assam Agricultural University, Guwahati (India). College of Veterinary Science, Department of Veterinary Pathology. Pathak, D.C.; Assam Agricultural University, Guwahati (India). College of Veterinary Science, Guwahati (India). Department of Veterinary Pathology. Bora, R.S.; Assam Agricultural University, Guwahati (India). College of Veterinary Science, Guwahati (India). Department of Livestock Production and Management. Gupta, A.; Defence Institute of Physiology and Allied Science, Delhi (India). *Achyranthes aspera* Linn. accelerates cutaneous wound healing in immunocompromised rats by modulating endogenous antioxidants. *Indian Journal of Veterinary Pathology* (India). (Dec 2012) v.36(2) p.183-186 KEYWORDS: ANTIOXIDANTS. HYDROZOA. IMMUNOLOGY. WOUNDS. RATS. ENDOGONALES.

*Achyranthes aspera* Linn is traditionally used to treat piles, pneumonia, cough and skin eruptions. The present study was designed to investigate the wound healing activity of 5% ointment of methanol extract of leaves of *A. aspera* (MEAA) by topical application and the endogenous antioxidant profile in experimental immunocompromised rats with excision wound. Immunocompromised state was induced by pre-treatment with hydrocortisone (HC) at 40mg/kg body weight (i.m.). Following one week pre-treatment with HC, excision wounds were created. The vehicle, 5% ointment of MEAA or standard drug (Himax) was applied topically twice daily for seven days. Healing potential was evaluated by the rate of wound contraction, estimation of enzymatic and non-enzymatic antioxidants like catalase, SOD, GSH, protein, Vitamin C and pro-healing marker, hydroxyproline content combined with histopathological study on 8th day post wounding. There was significant increase in the levels of enzymatic and non-enzymatic

antioxidants in the extract treated group as compared to control group. Histopathological study revealed collagen deposition, fibroblast proliferation, angiogenesis and development of basement membrane in *A.aspera* edgroup.The results revealed significant wound healing activity of MEAA in steroid-impaired wounds.

**318.** Bhardwaj, Chetna; Government Dungar College, Rajasthan (India). Department of Zoology. Gupta, M.L.; Government Dungar College, Rajasthan (India). Department of Zoology. Kumar, Naveen; Indian Veterinary Research Institute, Izatnagar (India). Principal Scientist, Division of Surgery.. Pathological alterations in the liver of Swiss albino mice induced by different degree of gamma radiation and cadmium. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.198-202 KEYWORDS: CADMIUM. GAMMA RADIATION. LIVER. MICE. PATHOLOGY.

In the present study 48 healthy adult Swiss albino mice were used to investigate the effects of radiation and CdCl<sub>2</sub>.The micewere divided into four groups. Group I (n=6) (Sham-irradiated), group II (n=6)(cadmium chloride treated), group III (n=18)(irradiated mice)and group IV (n=18)(mice treated with radiation and cadmium chloride). The mice of group III and IVwere further sub divided into 3 subgroups having 6 mice each. The mice of subgroups III received radiation dose of 1.2SGy, 2.5Gy and 5.0Gy, respectively. The mice of subgroups IV received CdCl<sub>2</sub> (20 ppm) treatment along with irradiation as described in subgroups III. One mice from each group/subgroup was euthanized after 1, 2, 4, 7, 14and 28days of treatment. After irradiation with various doses of gamma rays, histological changes dependupon the dose of radiation delivered. After the combined exposure of gamma rays and cadmium chloride, the histological changes were similar but showed higher magnitude than the individual exposure to radiation and cadmium chloride.

**319.** Joshi, Ankita; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Institute of Biotechnology.Chauhan, R. S.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). Institute of Biotechnology.. Anticancer effect of *Taxus Baccata* and cow urine on biochemical attributes of mice treated with Diethyl Nitrosamine. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.203-208 KEYWORDS: CANCER (GENUS). COW MILK. URINE. NITROSAMINES. MICE. TAXUS. BACCAUREA.

A large number of modern drugs have been isolated or derived from natural sources, based on their use in traditional medicine. The present investigation was to study the effect of extracts of *Taxus baccata* alone and in combination with indigenous Cow Urine Distillate (CUD) in mice.Carcinogenicity was induced by diethyl nitrosamine(200mg/kg)(DEN).In a singledose DEN challenge animals

were given extracts alone and in combination with CUD, daily and named them as test group. For control group no DEN and no treatment was given. Negative control was given only DEN, to check its carcinogenicity with control and test group. Tumors were developed in Negative control animals, which died early but no mortality was observed in the test group. After six month the blood and tissues from liver and kidneys were collected to study the effect of carcinogen, plant extracts and their formulation with CUD and various biochemical attributes like: Superoxide dismutase (SOD), Alkaline Phosphatase (ALP), Acid Phosphatase (ACP), AST, ALT, triglycerides, albumin, catalase, MDA, total protein, creatinine, cholesterol, HDL-Cholesterol etc. The results showed that there was an significant increase in SOD, MDA, GLU, ALP, ACP, ALT, AST and CAT, TP, albumin, globulin, total cholesterol, HDL, triglyceride etc. were significantly decreased as compared with control group. The test groups had shown significant hepatoprotective and anticarcinogenic activity against DEN. The present study concludes that *Taxus baccata* alone and its formulation with CUD have shown hepatoprotective and anticancer activity.

**320.** Kurade, N.P.; Indian Veterinary Research Institute, Palampur (India). Regional Station. Pati, U.S.; Indian Veterinary Research Institute, Palampur (India). Regional Station. Kishtwaria, R.S.; CSK HP Krishi Vishva Vidyalaya, Palampur (India). College of Veterinary Sciences, Department of Surgery Sahoo, A.; Indian Veterinary Research Institute, Palampur (India). Regional Station.. Causes of mortality in leopards (*Panthera pardus*) in Himachal Pradesh.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p209-211. KEYWORDS: NECROSIS. LESIONS. PANTHERS.

Thorough necropsy examination was carried out on 35 carcasses of leopards received from different parts of Himachal Pradesh during 2001-2009. The various causes of mortality recorded were traumatic injury (42.86%), enteritis (17.14%), pneumonia (20.0%), jaundice/hepatitis (8.57%) and autolysis/unidentified (11.43%). Among the cases of traumatic injuries, wire trap injuries (60.0%) due to entry into human habitat were most common. Pneumonia was the frequent cause of death in captive leopards as compared to wild trapped animals. Presence of tapeworm *Taenia taeniaeformis* was recorded in both wild and captive leopards (25.7%).

**321.** Beheral, Debasish; College of Veterinary Sciences and Animal Husbandry, Agartala (India). Department of Veterinary Pathology. Panda, S.K.; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Samal, Ashabaree; Indian Veterinary Research Institute, Izatnagar (India). Division of Veterinary Bacteriology & Mycology.. Pathology of spontaneous cases of early

chick mortality in Odisha. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.258-261 KEYWORDS: CHICKS. ESCHERICHIA. HISTOPATHOLOGY. MORTALITY. ORISSA.

The present retrospective study was undertaken to gain an insight on the loss in poultry due to disease and mortality in the early life of chicks. Post mortem of chicks within the age of 3 weeks in three calendar years were taken into account for this study. The disease conditions associated were identified as omphalitis, colibacillosis, enteritis, salmonellosis, aspergillosis, coccidiosis, infectious bronchitis, infectious bursal disease (IBD), visceral gout, ascites, hepatitis, nephritis and some unidentified miscellaneous conditions. More than 50% of young chicks died due to omphalitis, colibacillosis and enteritis associated with Escherichiacoli infection.

**322.** Kumar, Muneendra; National Dairy Research Institute, Karnal (India). Kaur, Harjit; National Dairy Research Institute, Karnal (India). Phondba, B.T.; National Dairy Research Institute, Karnal (India). Sontakke, U.B.; National Dairy Research Institute, Karnal (India). Gupta, Neelam; National Dairy Research Institute, Karnal (India). Ameliorative effect of zinc supplementation to lead exposed goat kids on lymphocyte proliferation and superoxide dismutase (SOD) expression. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 811-813 KEYWORDS: KIDS. CELL MEDIATED IMMUNITY. SUPEROXIDE DISMUTASE. PCR. LEAD.

In vivo studies were conducted to observe the adverse effects of lead and protective effect of zinc on lymphocyte proliferation and SOD expression in 18 crossbred (Alpine × Beetal) male goat kids. They were divided into 3 groups i.e. group 1 (control), group 2 (control + 50 ppm Pb) and group 3 (control + 50 ppm Pb + 50 ppm Zn). All the kids were fed as per standard dietary requirements for 90 days. Blood samples were collected on 0, 30, 60 and 90 days of Pb and Zn supplementation for lymphocyte separation. A fixed no. of cells ( $2 \times 10^6$ ) was grown in culture for 72 h for studying the lymphocyte proliferation and SOD expression. There was no effect of dietary treatments on feed intake of the animals. Overall average lymphocyte proliferation response at the end of 90 days duration was significantly lower in Pb supplemented group 2 as compared to groups 1 and 3. The adverse effect of lead on lymphocyte proliferation was recovered to some extent by Zn supplementation, but, it was still significantly less than the control, indicating that Zn addition in the diet of Pb exposed kids could not fully recover the animals from the adverse effect. SOD expression remained almost similar in group 1 during 90 days period, but substantial decrease in relative abundance of SOD at 60 days was observed in Pb supplemented group 2 which further decreased at 90 days of Pb exposure. The decrease in SOD expression was recovered to some

extent in goat kids of group 3 supplemented with Zn.

**323.** Monica, B.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Patra, P.H.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Khargaria, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Manna, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Chakraborty, A.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Mandal, T.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India).. Immunological and haematobiochemical studies of enrofloxacin with special reference to residue level following oral administration in goats. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 904-907 KEYWORDS: GOATS. FLUOROURACIL. ANTIMICROBIALS. RESIDUAL EFFECTS. BLOOD COMPOSITION. IMMUNOSUPPRESSION.

Effect of enrofloxacin on haematobiochemical and immunological parameters alongwith the residual level of enrofloxacin and its metabolite ciprofloxacin in black Bengal goat was carried out following daily oral administration at 5 mg kg<sup>-1</sup> body weight for 54 days. A significant decrease in haemoglobin %, total erythrocyte and lymphocyte count were noticed in experimental group in different days. Blood glucose and serum protein were not altered in both the groups. A significant decrease in IgG level on different days along with lymphocytopenia and decreased lymphocyte number in lymphoid organs of experimental animals indicate immunosuppressive effect. Increased serum AST and ALT activity concomitant with fatty changes and necrosis of liver suggest hepatitis. Degeneration of seminiferous tubule and depletion of spermatogenic cells were observed in testis of goats of experimental group. Vital organs contain residues of enrofloxacin and ciprofloxacin.

**324.** Bansal, Neelam; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Uppal Varinder; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Anuradha; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. Nephrotoxic effects caused by formaldehyde exposure in rabbits: A histomorphochemical study. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 935-937 KEYWORDS: RABBITS. ANIMAL MORPHOLOGY. FORMALDEHYDE. KIDNEY DISEASES.

The experiment was conducted to observe the effect of direct exposure of formaldehyde in different concentrations on the physio-anatomy of kidneys. For this purpose, 14 rabbits ageing 3– 6 months were divided into 3 groups; group 1 (n, 6) were exposed to 10% formaldehyde solution for 12 weeks, group 2 (n, 6) to 40%

formaldehyde solution for 6 weeks and group 3 (n, 2) served as control. After completion of experimental periods, fresh tissue samples were collected from both the kidneys for the demonstration of enzymes and some part of samples were also preserved in 10% NBF to study histological changes. The present study revealed that after an exposure to 40% formaldehyde solution, there was degeneration of glomeruli and tubular epithelium with necrosis of proximal and distal convoluted tubules. Marked congestion and haemorrhages were also seen in the glomeruli and intertubular blood vessels. There was weak activity of AKPase, ATPase, G-6-Pase, SDH, LDH and G-6-PD, and moderate to strong reaction of NADPH and NADH in the renal glomeruli, proximal and distal convoluted tubules. The alterations in the distribution pattern of phosphatases and oxidoreductases in the rabbit kidney reflects the impairment in the renal functions due to formaldehyde exposure.

**325.** Kalim, M.O.; College of Veterinary Science and Animal Husbandry. Durg (India). Zaman, R.; College of Veterinary Science and Animal Husbandry. Durg (India). Tiwari, S.K.; College of Veterinary Science and Animal Husbandry. Durg (India).. Surgical management of obstructive urolithiasis in a male cow calf. *Veterinary World (India)* . (May 2011) v.4(5) p. 213-214 KEYWORDS: CALVES. UROLITHIASIS. SURGICAL OPERATIONS.

The surgical management of obstructive urolithiasis in male cow calves and buck includes urethrotomy, cystotomy or urethrostomy. The present study place on record, a typical case of obstructive urolithiasis in cow calves and in buck and its surgical management.

**326.** Mukhopadhyay, C. S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Tokas, Jayanti; CCS Haryana Agricultural University, Hisar (India). Mathur, P. D.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. Prospects and Ethical Concerns of Embryonic Stem Cells Research-A Review. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 281-286 KEYWORDS: ETHICS.

Stem cell research has appeared as a silver lining of hope over the dark cloud of some untreatable diseases like cancer and certain neurological disorders. Embryonic stem cells, the tabula rasa, holds much promise in this regard owing to its totipotency, howbeit, it has whirled a severe tempest all over the world on the point of humanity. The present review article includes the chronology of stem cell research with special reference to the techniques that were evolved in due course of research, the controversy over the application of embryonic stem cells for therapeutics and present status of stem cell research under Indian context. India is being increasingly alluring the foreign companies to invest in this project

since a huge prospect in stem cell marketing business is foreseen in this country.

**327.** Jagadeesh Babu, A.; College of Veterinary Science, Tirupati (India). Department of Veterinary Public Health. Rupa Sundari, A.; College of Veterinary Science, Tirupati (India). Department of Veterinary Public Health. Indumathi, J.; College of Veterinary Science, Tirupati (India). Department of Veterinary Public Health. Srujan, R.V.N.; College of Veterinary Science, Tirupati (India). Pharmacology and Biochemistry. Sravanthi, M.; College of Veterinary Science, Tirupati (India). Pharmacology and Biochemistry.. Study on the Antimicrobial activity and Minimum Inhibitory Concentration of Essential Oils of Spices. *Veterinary World (India)*. (Jul 2011) v.4(7) p. 311-316 KEYWORDS: ANTIMICROBIAL PROPERTIES. SPICES. CINNAMON. GARLIC. CLOVES. BACTERIA. ANTIGENS.

Antibacterial activity and minimum inhibitory concentration (MIC) of essential oils of garlic, clove and cinnamon were estimated by using various bacterial pathogens. Among the bacterial pathogens tested against essential oil of garlic, *Staphylococcus aureus* was found to be highly sensitive followed by *E.coli*, *L.monocytogenes* and *S.pyogenes* were found to be less sensitive. The essential oil of clove was found to be most active against *S.aureus* followed by *E. coli*, *B.cereus* and *C. jejuni*. The essential oil of cinnamon was also most active against *S.aureus* followed by *E.coli* and *C.jejuni*. Essential oil of cinnamon was found to be active against all the bacterial pathogens tested, when compared to garlic and clove oils. However *Staph. aureus*, *E. coli* and *C.jejuni* were found to be most sensitive to the action of essential oils of garlic, clove and cinnamon. Among the bacterial pathogens tested against essential oils of spices to know the MIC by agar diffusion method, *C.jejuni* was found to be most sensitive to the essential oil of garlic followed by *E.coli*, *S. typhimurium* and *Staphylococcus aureus*. *L. monocytogenes* and Methicillin resistant *Staph. aureus* were found to be comparatively less sensitive. Essential oil of clove was also found to be highly effective against *C.jejuni* followed by *E.coli*, *S.typhimurium* and *S.aureus*. Again *L.monocytogenes* and Methicillin resistant *S.aureus* were comparatively less sensitive to the action of essential oil of clove. All most all the bacterial pathogens tested were found to be sensitive to the essential oil of cinnamon. However *C.jejuni* and *E.coli* were found to be most sensitive followed by *S.typhimurium*, *Staph. aureus* and Methicillin resistant *Staph. aureus*.

**328.** Sanganal, Jagadeesh S.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Jayakumar,.K.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Jayaramu, G.M.; Govt. of Karnatka, Bangalore

(India) State Dept. of AH&VS, Tikare,V.P.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Paniraj, K.L; Veterinary College, Hassan (India). Swetha, R; University of Connecticut, Connecticut (USA).. Effect of cow urine on wound healing property in Wister Albino Rats. Veterinary World (India). (Jul 2011) v.4(7) p. 317-321 KEYWORDS: RATS. LABORATORY ANIMALS. COWS. URINE. WOUNDS. HEALING.

The wound healing activity of cow urine was studied in Wistar albino rats. The efficacy of wound healing property was evaluated by excision wound model. The parameter studied was the rate of wound contraction. The studies on excision wound healing revealed that all the groups showed decreased wound area from day to day. On day 4th, the external application of urine showed significant increase in wound healing in male and female rats compared to all other groups. However, on 14 post wounding day, Group I and VIII animals showed 0 % and 0.40.4 % of healing was left, which may be due to normal immunity of the animals. Where as nitrofurazone treated animals showed 0 % and 0.50.3 % healing .The study revealed that the cow urine on external application to the wound, hastened the wound healing process.

**329.** Shivakumar, B.N.; Mangalore Veterinary Service Centre, Manglore (India). Upadhya, Manohara; Mangalore Veterinary Service Centre, Manglore (India).. Ameloblastoma of the mandible in a male dog – A Case Report. Veterinary World (India). (Jul 2011) v.4(7) p. 328-329 KEYWORDS: DOGS. NEOPLASMS.

Ameloblastomas are odontogenic tumors known for their aggressive nature. Because of the odontogenic origin, they are seen affecting the mandible and maxilla. Like humans, animals like dogs, horses may also develop these lesions. In this report, ameloblastoma of the mandible in a male dog is described, The lesion clinically appeared like an exophytic growth on the gingiva near mandibular left canine tooth, radiograph showed a large multilocular radiolucency with destruction of the lower mandible. The lesion recurred after 2 years following the conservative removal. This case report is interesting because similar to humans, the dogs too suffer from the odontogenic lesions. The radiographic, histologic features and the behavior pattern were similar to humans' where as the treatment rendered was only conservative keeping the limited life span of the dog.

**330.** Pattanaik, P.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Sahoo, G.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Barik, N.; Orissa University of Agriculture and

Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Palai, T.K.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Bisoi, P.C.; Orissa University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Nitric Oxide and hydrogen peroxide production by goat mucosal epithelial tissue. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 195-198 KEYWORDS: GOATS. MUCOSAL DISEASES. EPITHELIUM. MUCOUS MEMBRANE. HYDROGEN PEROXIDE.

The production of nitric oxide by goat mucosal epithelial cells was studied to understand the nitric oxide (NO) pathway of killing microorganisms. Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) production by the mucosal epithelial cells without any activation was studied to understand the oxygen dependent mucosal immune system of goats. The production of NO in nM/0.1gm of different mucosal tissues per hr during resting stage was 9.01±0.75 from intestine, 22.65±0.75 from trachea and 61.5±2.73 from uterus and were found to be significantly different from each other. The incubation of these cells with sodium nitroprusside, a proven nitrogen donor, activated these cells in different tissues differently. The goat intestinal epithelium was significantly activated by the sodium nitroprusside in a dose dependent manner. In all other tissue epithelium sodium nitroprusside activated the nitric oxide production non-significantly. In present study the results clearly indicated that significantly high amount of H<sub>2</sub>O<sub>2</sub> was produced by uterine mucosal epithelial cells (26.81±0.72 nM/0.1g tissue/hr) whereas, it was lowest in tracheal mucosal epithelium (8.50±0.43 nM/0.1g tissue/hr). All the tissues studied produced H<sub>2</sub>O<sub>2</sub> in resting state, indicated the active participation of these mucosal epithelial layers in oxidative immunodefence system.

## **L72 Pests of animals**

**331.** Das, S.S.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Dept. of Veterinary Parasitology. Rajkumar, K.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Dept. of Veterinary Epidemiology and Preventive Medicine. Sreekrishnan, R.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Dept. of Veterinary Parasitology. Rao, V.N.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Dept. of Veterinary Clinical Medicine, Ethics and Jurisprudence. Kumar, D.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Dept. of Veterinary Parasitology.. Occurrence of *Liponyssoides sanguineus* and *Polyplax spinulosa* on an albino rat in Puducherry. Indian Journal

of Veterinary Research (India). (Jan-Jun 2012) v. 21(1) p.70-72  
KEYWORDS: POLYPLAX. RATS.

Mite *Liponyssoides sanguineus* and louse *Polyplax spinulosa* are reported from rat (*Rattus norvegicus*) for the first time from Puducherry.

**332.** Goswami, R.; M.J.P. Rohilkhand University, Bareilly (India). Department of Animal Sciences. Singh, S.M.; M.J.P. Rohilkhand University, Bareilly (India). Department of Animal Sciences. Kataria, M.; Indian Veterinary Research Institute, Izatnagar, (India). Biochemistry Section. Somvanshi, R.; Indian Veterinary Research Institute, Izatnagar, (India). Division of Pathology.. Clinicopathological studies on spontaneous Trichosomoidiasis in rats. . Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.152-159 KEYWORDS: RATS. NATURAL HYBRIDIZATION. HISTOPATHOLOGY.

The prevalence of *Trichosomoides crassicauda* infection was significantly higher (34%) in laboratory rats procured from a closed colony of IVRI while surprisingly it was not recorded (0%) in free living wild rats of same locality of Bareilly, UP. This parasite produced asymptomatic infection in urinary bladder and failed to show diagnostic haematological, serum and tissue biochemical alterations in body fluids and tissues of visceral target organ urinary bladder. Although *T. crassicauda* infections can be conventionally diagnosed in rats by presence of larvated eggs, worms in urine samples; focal hyperplasia of urothelium, sections of worms and eggs in urothelium or in lumina of urinary bladder on histopathological examination of urinary bladder but demonstration of worms by SEM method is useful for morphological studies.

**333.** Jaiswal, C.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India). College of Veterinary Science, Department of Veterinary Pathology. Verma, Y.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur, (India). College of Veterinary Science, Department of Veterinary Pathology. Shrivastav A.B.,; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur, M.P. (India). College of Veterinary Science, Department of Veterinary Pathology. Sharma, V.; Madhya Pradesh Pashu Chikitsa Vigyan Vishwavidyalaya, Jabalpur (India). College of Veterinary Science, Department of Veterinary Pathology.. Effect of alpha-tocopherol on pathological alteration induced by acute exposure of chlorpyrifos with *E. coli* infection in albino rats.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.160-163  
KEYWORDS: PATHOLOGY. RATS. CHLORPYRIFOS.

A study was conducted to evaluate the effect of alpha-tocopherol on pathological alterations experimentally induced by acute

exposure of chlorpyrifos(CPF)along with E.coli infection in male albino rats.Thirty six male rats weighing around 100-120g were divided into 6 groups of 6 each rats. Group I rats were kept as control; group I rats were intraperitoneally inoculated with E.coli. (0.3ml) at 24hills prior to sacrifice. Group III rats were fed as group I and CPF (10.6mg/kg b.wt.) reconstituted with 2 ml soya oil and given by oral gavage daily for 15 days. Group IV rats were treated with CPF same as group III and I/P inoculation of E.coli was same as group IT.Group V rats were treated with CPF same as group III with Vitamin E00 mg/kg feed. Group VI rats were treated with CPF same as group IV and Vitamin E00mg/kgfeed along with E.coli as in group IT throughout the experiment.Rats were sacrificedat 15th day by decapitation method. Dose dependent pathological changes were noticed in CPF treated groups. Grossly liver was swollen, pale and showing focal area of degeneration, congestion in lungs and mild swelling with areas of haemorrhages on the surface of kidney. Microscopically in CPF treated groups, there was degenerative changes in cytoplasm of hepatocytes and focal/multifocal necrosis, perivascular lymphocytic infiltration of mononuclear cell. Fibrosis and oedema in portal area were also seen. In E. coligroup, lesions were similar as CPFtreated group but with sever intensity. Vitamin E treated group showed considerable improvement in these changes. The present study suggested that the pretreatment of alphatocopherol reduced the effect of chlorpyrifos induced toxicity and its severity on E.coli infection in albino rats.

**334.** Sharma, A.K.; Indian Veterinary Research Institute, Bareilly (India). Division of Veterinary Pathology. Sahoo, Monalisa; Indian Veterinary Research Institute, Bareilly (India). Division of Veterinary Pathology. Singh, K. P.; Indian Veterinary Research Institute, Bareilly (India). CADRAD. Singh, R.; Indian Veterinary Research Institute, Bareilly (India). Division of Veterinary Pathology. Somvanshi, R.; Indian Veterinary Research Institute, Bareilly (India). Division of Veterinary Pathology. Spirocercosis in stray dogs.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.230-232  
KEYWORDS: OESOPHAGUS. DOGS. SPIROCERCA. LUPINUS.

Spirocercalupi infection was encountered in 5 cases of stray dogs during the necropsy. Grossly, the esophagus had small multiple nodules in 1case and large nodules in 4 cases containing the adult parasites.Oesophageal nodular lesions in 1 case containing the parasites are the most common findings for definitive diagnosis of spirocercosis in dogs and histopathology revealed the diffuse proliferation of fibroblasts along with infiltration of inflammatory cells surrounding the larvae.

**335.** Divya, C.; KVASU, College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Suvaneeth, P.; KVASU, College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Vijayan, N.; KVASU, College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Kritiga, K.; KVASU, College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. A report on cerebral micro filariasis and its concurrence with rabies in canines. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.233-235 KEYWORDS: FATS. BRAIN. DIROFILARIA. MICROFILTRATION. NERVOUS SYSTEM. RABIES. DOGS.

The study reports the identification of microfilariae of the nematode *Dirofilaria* spp. in the impression smear from brain of rabies suspected dogs. The dogs succumbed to death after exhibiting nervous signs of excitement, restlessness, aggressiveness and unusual biting tendency which lasted for 3 days. The animals were suspected of being infected with rabies and hence diagnostic tests for the same were conducted. Seller's staining of the impression smear from hippocampus was done to detect the presence of Negri bodies. The presence of microfilariae of *Dirofilaria* spp. could be detected in the impression smears taken for Seller's staining as well as for direct Fluorescent Antibody Test. Histopathological examination of brain revealed mild degree of gliosis. The nervous symptoms exhibited by the dog could be attributed to deterioration of brain function, which could be either due to rabies or aberrant migration of the microfilaria to this rare ectopic site.

**336.** Haque, M.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Jyoti; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Singh, N.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Rath, S.S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Ghosh, S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Epidemiology and seasonal dynamics of Ixodid ticks of dairy animals of Punjab state, India. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p.661-664 KEYWORDS: METASTIGMATA. IXODIDAE. DAIRY COWS. PUNJAB.

Cattle (890) and buffaloes (636) were examined from 8 districts of Punjab state, India with an overall prevalence of 85.28 and 57.10% *Rhipicephalus* (*Boophilus*) *microplus*, 20.45 and 52.20% *Hyalomma* *anatolicum* *anatolicum* and 5.73 and 9.90% mixed infestation in cattle and buffalo population, respectively. *R. microplus* was the predominant tick in cattle population (85.28%).

**337.** Chitra, R.; Tamil Nadu University of Veterinary and Animal Sciences, Namakkal (India). Rajendran, S.; Tamil Nadu University of Veterinary and Animal Sciences, Namakkal (India). Prasanna, D.; Tamil Nadu University of Veterinary and Animal Sciences, Namakkal (India). Kirubakaran, A.; Tamil Nadu University of Veterinary and Animal Sciences, Namakkal (India).. Influences of age on the prevalence of Parasitic infections among donkeys in Erode district, Tamilnadu, India. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 258-259 KEYWORDS: ASSES. PARASITOSESES. TAMIL NADU. EPIDEMICS.

Parasitic infections are known to affect donkeys causing considerable mortality and morbidity. Fresh faecal samples were directly collected from the rectum of donkeys belonging to four age groups viz. 0.5 years, 0.5 – 3.0 years, 3.1 – 8.0 years and 8 years. Donkeys of different age groups in the present study had slightly different helminth profiles. Young donkeys (0.5 years) generally had a high prevalence of *Strongyloides*. They seemed to have less number of *Strongyles* and *Ascarids*. But the level of *Strongyles* and *Ascarids* increased when the donkeys became older, but then decreased. It may be due to the development of age immunity to *Strongyles* and *Ascarids* in adult donkeys. *Strongyloides* were found to less in older donkeys.

**338.** Karunakaran, Sunitha; District Veterinary Centre, Palakkad (India). Veterinary Clinical Lab. Pillai, U. N.; College of Veterinary and Animal Sciences, Pookot (India). Department of Clinical Medicine. Sasidharan, H.P.; SLBP, Thrissur (India). Veterinary Surgeon.. *Babesia gibsoni* infection in a German Shepherd dog. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 269-270 KEYWORDS: GUARD DOGS. BABESIA GIBSONI. BABESIOSIS. BABESIA.

*Babesia gibsoni* causes a chronic disease in canines with progressive anaemia as the main sign. Ixodid tick vectors are transmitting the disease. Confirmatory diagnosis can be made by peripheral blood smear examination after Giemsa staining for the demonstration of signet ring shaped trophozoites inside RBC's and can be treated with Dimenazine aceturate and Oxytetracycline. This paper is a report of *Babesia gibsoni* infection in a German shepherd dog and its successful treatment.

**339.** Samal, A. K.; Indian Veterinary Research Institute, Izatnagar (India). Patra, P. B.; Govt. of Orissa, Orissa (India) State Department of AH and VS. Maharana, Biswa Ranjan; Indian Veterinary Research Institute, Izatnagar (India).. Simultaneous Infestation of a Buffalo calf with *Ascaris* and *strongyloides*: A case study. *Veterinary World (India)*. (Jul 2011) v.4(7) p. 322-323 KEYWORDS: CALVES. WATER BUFFALOES. ASCARIS. INFESTATION. STRONGYLOIDES.

*Toxocara vitulorum* occurs in the small intestine of Indian buffalo,

and is found in many places of world. Small intestinal infestation with *Strongyloides papillosus* occurs in ruminants. However, we diagnosed a nondescript Indian buffalo calf infested simultaneously with *Toxocara vitulorum* and *Strongyloides papillosus* and treated it with standard regimen and found the subject cured.

**340.** Tilling, Tayo; Indian Veterinary Research Institute, Izatnagar (India). Longjam, Neeta; Assam Agricultural University, Guwahati (India). Perme, Bangkeng; Indian Veterinary Research Institute, Izatnagar (India).. Protozoan Diseases of Livestock in Arunachal Pradesh - An Overview. Veterinary World (India). (Jul 2011) v.4(7) p. 332-336 KEYWORDS: LIVESTOCK. PROTOZOAL INFECTIONS. ARUNACHAL PRADESH.

The people (Tribes) of Arunachal Pradesh have the natural tendency to remain close contact with animals since immortal. The domestic animals are kept in basement of the house with human occupants in the first floor of same house. They remain in close contact with cattle, sheep, goat, pigs, poultry, cats and dogs throughout the year, exposing them to many animal born diseases of occupational risk. People are not aware of zoonotic diseases sharing between domesticated animal and human beings except for Rabies. So, there is regular out break of most common protozoan zoonotic diseases in human Giardiasis caused by *Giardia* spp. and amoebiasis caused by *Entamoeba* spp. in the state. Another important disease of clinical significance is toxoplasmosis. *Toxoplasma* usually causes a febrile illness and abortions in pregnant women. The source of infection in humans may be due to close proximity with cats and unhygienic sanitation. Similarly high incidences of sarcocystis were reported from many district of Arunachal Pradesh. Source of transmission were adjudged to be eating of smoked pork and other meat product along with natural habit of eating raw vegetable as salad from contaminated areas could be the probable mode of transmission.

**341.** Sahoo, A.; Central Sheep and Wool Research Institute, Avikanagar (India). Khan, F.A.; Central Sheep and Wool Research Institute, Avikanagar (India). Karim, S.A.; Central Sheep and Wool Research Institute, Avikanagar (India).. A Review on Nutrition and Gastro-Intestinal Nematode Parasitism: Interaction and Implications in Ruminant Livestock. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 1-20 KEYWORDS: LIVESTOCK. DIGESTIVE SYSTEM. NEMATODA. PARASITISM.

Gastrointestinal nematode (GIN) infection remains one of the main constraints to livestock production both in temperate and tropical countries. The usual mode of control of GIN based on the repeated use of anthelmintics is now strongly questioned because of

increasing development of resistance to these molecules and also, leaking and accumulation of drug residues/metabolites in meat, milk, egg or their products thereby increasing concern for safe livestock products for human consumption. Among the alternative methods to anthelmintics currently available, the manipulation of host nutrition in order to improve the host resistance and/or resilience to parasitic infections seems to represent one of the most promising options to reduce the dependence on conventional chemotherapy and to favour the sustainable control of GIN. This paper will discuss the interactions between nutrition and parasitism and include discussion on quantitative (influence of protein, energy, micronutrients and other phyto-additives) as well as to qualitative (organic livestock farming, foraging) aspects of the diet. The beneficial effect of nutrition, more specifically, the importance of protein nutrition for the maintenance of host immunity to parasitism, the potential use of novel crops and possibilities for biological control have also been discussed. In addition, more work are needed to define anthelmintic resistance, non-chemical alternatives to parasite control, modulation of immunity to parasites by genetic and nutritional factor, integrated parasite control strategy and best use of these technologies in different geographic regions.

**342.** Singh, D.; Central Sheep and Wool Research Institute, Avikanagar (India). Swarnkar, C.P.; Central Sheep and Wool Research Institute, Avikanagar (India). Kumar, S.; Central Sheep and Wool Research Institute, Avikanagar (India). Paswan, C.; Central Sheep and Wool Research Institute, Avikanagar (India).. Effect of Garole inheritance on strongyle infection in sheep managed under semi-arid conditions of Rajasthan. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 188-194 KEYWORDS: SHEEP. STRONGYLIDAE. SEMIARID ZONES.

Parasitic gastroenteritis (PGE), dominated by haemonchosis is one of the major constraints to profitable sheep production and sole reliance on chemotherapeutic measures for its control resulted in additional problem of anthelmintic resistance. Among alternate approaches, exploitation of genetic control of PGE is subject of recent interest and in this direction a study was conducted to observe the effect of Garole inheritance and / or Fec B gene on strongyle infection through assessing the incidence and intensity profile under natural challenge in Garole (100% Garole inheritance and 98% Fec B carrier), crosses of Garole and Malpura (50–75% Garole inheritance and 55% Fec B carrier) and Malpura sheep (no Garole inheritance and 100% Fec B non-carrier) at Central Sheep and Wool Research Institute, Avikanagar in semi-arid Rajasthan. Intensity and intensity profile exhibited minimum tune of infection in Garole followed by Garole X Malpura and maximum in

Malpura sheep throughout the year. There was non-significant variation in intensity of strongyle infection for each month among all the 3 different Fec B genotypes. However, it remained relatively at the lowest in Fec B homozygous sheep followed by Fec B heterozygous carrier and highest in Fec B non-carrier sheep. The findings revealed that Garole inheritance provides resistance against gastrointestinal nematodes to some extent; however, Fec B gene in Garole was not associated with intensity of infection.

**343.** Mohan Snigdha; Banaras Hindu University, Varanasi (India), Department of Zoology. dines1953ahoo.com Kumar Dinesh; Banaras Hindu University, Varanasi (India), Department of Zoology. Effects of uv-c irradiation on fecundity and fertility of the red cotton bug, *Dysdercus koenigii* (Heteroptera: pyrrhocoridae): Role of partially sterile insects in sterile insect techniques. Indian Journal of Entomology (India). (Jun. 2012) v.74(2)p.176-182 KEYWORDS: DYSDERCUS KOENIGII. PEST CONTROL. INTEGRATED PEST MANAGEMENT. FERTILITY. MATING SYSTEMS.

The sterile insect technique (SIT), an environment-friendly pest control technique, can be used as an efficient component of area-wide integrated pest management programme. Although there have been several studies of how partially sterile males or completely sterile females contribute in SIT programmes, role of partially sterile females has not been considered. In the present study, role of partially UV-sterilised female of *Dysdercus koenigii* in control of its population was evaluated. Nymphs were irradiated with UV rays (254nm) at 10 min and 20 min durations to get partially and completely sterile adults respectively. Six type of crosses, cross-1: wild female  $\times$  wild male ( $W_{\text{♀}} \times W_{\text{♂}}$ ), cross-2: partially sterile female  $\times$  partially sterile male ( $PS_{\text{♀}} \times PS_{\text{♂}}$ ) cross-3: partially sterile female  $\times$  wild male ( $PS_{\text{♀}} \times W_{\text{♂}}$ ), cross-4: partially wild female  $\times$  partially sterile male ( $W_{\text{♀}} \times PS_{\text{♂}}$ ), cross-5: completely sterile female  $\times$  wild male ( $CS \times W$ ) and cross-6 completely sterile female  $\times$  partially sterile male ( $CS_{\text{♀}} \times PS_{\text{♂}}$ ) were maintained in the laboratory to examine the comparisons of mating compatibility, fecundity, fertility and productivity among them. Results reveal that UV irradiation significantly suppressed the reproductive ability in all crosses. The mating success and reproductive sterility in cross-2 were significantly high in comparison to all other crosses. It is concluded that partially sterile females might also impart a successful role in suppression of wild population like sterile males. Results demonstrate that release of partially sterile females alone or along with/without completely sterile females and partially sterile males in the field could be highly advantageous in improvement of SIT programmes..

**344.** Goswami D; Central Silk Board, Lahdoigarh, Jorhat, Assam (India). Central Muga Eri Research & Training Institute. dgoswamicsbahoo.co.inSingh N.I.; Central Silk Board, Lahdoigarh, Jorhat, Assam (India). Central Muga Eri Research & Training Institute. Environmental effects on seed cocoon quality and fecundity of muga silkworm (*Antheraea assamensis* helper). Indian Journal of Entomology (India). (Jun. 2012) v.74(2)p.186-188 KEYWORDS: SEED TREATMENT. SILKWORMS. ENVIRONMENTAL FACTORS.

**345.** Khan, F.A.; Central Sheep and Wool Research Institute, Avikanagar (India). Sahoo, A.; Central Sheep and Wool Research Institute, Avikanagar (India). Dhakad, S.; Central Sheep and Wool Research Institute, Avikanagar (India). Pareek, A.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Karim, S.A.; Central Sheep and Wool Research Institute, Avikanagar (India).. Effect of trickle infection with *Haemonchus contortus* on pathophysiology and metabolic responses of growing lambs. Indian Journal of Animal Sciences (India). (Oct 2011) v. 81(10) p. 1005-1009 KEYWORDS: LAMBS. HAEMONCHUS CONTORTUS. HAEMONCHUS. METABOLISM. PATHOLOGY.

An experiment was conducted to investigate the effect of trickle infection of *Haemonchus contortus* on lambs maintained under standard reference feeding with respect to metabolic responses and pathophysiology. The experiment was continued for 10 weeks with the record of weekly body weight, faecal egg count, haematological (haemoglobin, packed cell volume, differential leucocyte count) and biochemical parameters (total serum protein, albumin and iron). A metabolic trial was conducted after 6 weeks of infection. The lambs were slaughtered after 10 weeks and total worm burden was assessed. There was nonsignificant difference in intake and digestibility of nutrients except CP, which reduced in infected group. The N balance was similar between the groups. The blood haemato-biochemical parameters also revealed a nonsignificant alteration except some periodic and low levels of total protein and albumin in few infected animals. The eosinophil count was significantly higher in infected animals. The absence of significant effect of infection on the parameters studied was probably due to high protein diet fed to the lambs that might have negated the adverse effect of parasitism.

### **L73 Animal diseases**

**346.** Mishra, N.; Indian Veterinary Research Institute, Bhopal (India). Rajukumar, K.; Indian Veterinary Research Institute, Bhopal (India). Kalaiyarasu, S.; Indian Veterinary Research Institute, Bhopal (India). Dubey, S.C.; Indian Veterinary Research Institute, Bhopal (India)..

Pestivirus infection, an emerging threat to ruminants in India: A review. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 545-551 KEYWORDS: RUMINANTS. PESTIVIRUS. SWINE FEVER VIRUS. BOVINE DIARRHOEA PESTIVIRUS. BORDER DISEASE. INDIA.

(BVDV-1), BVDV-2, border disease virus (BDV) and classical swine fever virus (CSFV). Among ruminant pestiviruses, BVDV/BDV infections occur worldwide and due to its economic importance, BVD is listed by O I E as a priority cattle disease for international trade. Pestivirus antibodies were detected in several countries with prevalence rates varying from 0–90% in cattle and 0–50% in sheep. Ruminant pestiviruses are genetically and antigenically diverse, as displayed by identification of 16 subtypes within BVDV-1, 2 subtypes within BVDV-2 and 7 subtypes within BDV species. Heterogeneity in host spectrum, virulence and clinical signs provide further challenges in disease diagnosis and control. Both large and small ruminants form backbone of the livestock sector in India. BVD was earlier considered exotic despite serological evidence of BVDV infection reported during 1980's and 90's. The first confirmatory evidence of The genus Pestivirus in the family Flaviviridae comprises 4 recognized species: Bovine viral diarrhoea virus type 1 BVD by virus isolation from cattle was reported in 2004, followed by its detection in sheep, buffalo, yak and goats. Later reports established the predominant occurrence of BVDV-1 and sporadic occurrence of BVDV-2, with BVDV-1b, BVDV-1c, BVDV-2a and BVDV-2b genotypes identified in various species of ruminants. Furthermore, moderate pathogenicity of BVDV-1 was demonstrated in experimentally infected cattle. A systematic surveillance of ruminant pestiviruses and their economic implications need to be taken up in future. In this review, we discuss the current status of ruminant pestivirus infections in India besides highlighting the gaps in current knowledge with regard to epidemiology, diagnosis and control.

**347.** Verma, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Sinha, D.K.; Indian Veterinary Research Institute, Izatnagar (India). Singh, B.R.; Indian Veterinary Research Institute, Izatnagar (India).. Detection of Salmonella from clinical samples of dogs by PCR. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 552-555 KEYWORDS: DOGS. SALMONELLA. PCR.

In present cross sectional study, faecal swabs and blood samples were collected from 250 dogs of Bareilly city, Uttar Pradesh, India and examined for Salmonella spp. using standard culture method and polymerase chain reaction (PCR) using primers Cohen-1 and Cohen-2. Salmonella were isolated from 1 faecal and 2 blood clots samples. Isolates from faeces were characterized as *S. Weltevreden* [3, 10; r; z ] and that from blood as *S. Typhimurium* [4, 5, 12; i; 1, 2). Whereas an amplicon of 496 bp was amplified from 6 faecal and 4

blood clot samples. As known positive controls, viz. DNA extract of *S. Typhi* and cell lysate of *S. Typhimurium*, also yielded similar amplicons. The relative sensitivity, relative specificity and accuracy of PCR considering isolation as gold standard was found 100%, 97.17% and 97.20%, respectively. The PCR was found more rapid and sensitive than traditional culture method of isolation from clinical samples which further required biochemical and serological testing for confirmation.

**348.** Ghosh, R.; University of Calcutta, Kolkata (India). Chakrabarty, M.; University of Calcutta, Kolkata (India). Homechaudhuri, S.; University of Calcutta, Kolkata (India). Analysis of haemopoietic cells, blood variables and histopathological changes in *Channa punctatus* (Bloch) following experimental inoculation of two strains of aeromonads. *Indian Journal of Animal Sciences* (India). (June 2011) v. 81 (6) p. 641-647 KEYWORDS: CHANNA PUNCTATA. FISH DISEASES. HISTOPATHOLOGY. BLOOD COMPOSITION.

Studies have been made to analyse the histopathological changes in head kidney and liver, erythropoietic and leucopoietic cells in head kidney and total erythrocytic and leucocytic populations in the peripheral blood of adult *Channa punctatus* (Bloch) following experimental inoculation of sublethal dose of *Aeromonas hydrophila* and *Aeromonas salmonicida* respectively during various exposure periods. Histopathological examinations showed initiation of necrosis, periglomerular degeneration in head kidney and formation of necrotic hepatocytes in liver compared to sham-injected control (SIC). Significant changes in total erythrocytic count (TEC) in aeromonad-treated groups were less pronounced over the most exposure periods. Similar observations were also recorded from the study among erythropoietic cell lineage from the head kidney tissue imprints. On the contrary, neutrophils, lymphocytes and macrophages among the leucocytes elicited significant variations in aeromonad-injected fish throughout the exposure periods with little fluctuations in the head kidney. An initial steep increase in the total leucocytic count (TLC) was also found in the peripheral blood of aeromonad-treated groups.

**349.** Rout, M.; Project Directorate on Foot and Mouth Disease, Mukteswar, Nainital (India). Saikumar, G.; Indian Veterinary Research Institute, Izatnagar (India). IDivision of Pathology,. Pathology of classical swine fever in slaughtered pigs.. *Indian Journal of Veterinary Pathology* (India). (Dec 2012) v.36(2) p.136-142 KEYWORDS: ACUTE COURSE. SWINE FEVER. CHRONIC COURSE. PATHOLOGY. SWINE. SLAUGHTERING.

The present work was conducted to study the prevalence and pathology of classical swine fever (CSF) in slaughtered pigs in

Bareilly, Uttar Pradesh. Real-time PCR was used for confirmation of CSFV infection in pigs. The overall prevalence of CSF as determined by the detection of CSFV genome in tonsils from 1120 pigs by real-time PCR was 7.67% (86/1120). Out of 86 positive CSF cases, 68.60% (59/86) were categorized as acute, 11.62% (10/86) as chronic and 19.76% (17/86) as clinically inapparent CSF based on standard gross lesions. All acute cases revealed typical hemorrhagic lesions and chronic cases revealed colonic button ulcers as well as pneumonic changes. Severe hemorrhages in visceral organs and marked lymphoid depletion in almost all lymphoid tissues were the most notable findings in acute and chronic CSF respectively. This paper provides a clear-cut pathological picture of CSF in slaughtered pigs that might help the field veterinarians to give a snap-shot diagnosis of the disease at an earliest.

**350.** Deori, L.; College of Veterinary Science, Guwahati (India). Department of Pathology. Rahman, T.; College of Veterinary Science, Guwahati (India). Department of Pathology. Barman, N.N.; College of Veterinary Science, Guwahati (India). Department of Microbiology. Sero-prevalance and pathology of classical swine fever (CSF) in pigs in certain districts of Assam.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.143-147 KEYWORDS: ELISA. PATHOLOGY. SWINE. SWINE FEVER.

During the study period from August 2008 to May 2010, many outbreaks of Classical Swine Fever occurring in eight districts of Assam were attended and a total of 122 serum samples were collected for detection of CSFV specific antibody by indirect ELISA, where 52 (42.62%) samples were found positive. The clinical signs observed were depression, inactiveness, off-fed, high rise of temperature, huddling together, conjunctivitis, thick ocular discharge, laboured breathing, staggering gait, erythematous lesions in the skin of the abdomen, ears, and the medial side of the legs. A total of 180 carcasses died of suspected CSF were necropsied. The gross changes were haemorrhage in the subcutis, "turkey egg" appearance of kidney, enlarged, edematous & haemorrhagic lymph nodes, button ulcers in large intestine, pneumonia, haemorrhage in heart, urinary bladder and haemorrhage and congestion in the brain. Histopathologically, lymphoid follicular atrophy as well as depletion and necrosis in spleen, LN and Peyer's patches in ileum with haemorrhage, interstitial or focal glomerular nephritis, pneumonia and bronchiolar hyperplasia, haemorrhage in the myocardium and submucosa of urinary bladder were observed. The brain showed neuronophagia, satellitosis, haemorrhages and congestion of the blood vessels along with meningitis, perivascular cuffing, glial nodule formation and necrosis of Purkinje's cells in cerebellum. A total of 98 samples were

processed and 58.16 percent were found positive for viral antigen, by Sandwich ELISA.

**351.** Phukan, A.; College of Veterinary Science, Assam Agricultural University, Guwahati (India). Department of Veterinary Clinical Medicine, Ethics & Jurisprudence Chakraborty, A.; College of Veterinary Science, Assam Agricultural University, Guwahati (India). Department of Veterinary Clinical Medicine, Ethics & Jurisprudence Deka, D.; ICVSC& AH, CAU, Aizwal (India). Boro, P.K.; State Veterinary Dispensary, Bokakhat (India). Pathology of parvovirus infection in dogs.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.148-151 KEYWORDS: CANINE ADENOVIRUS. ELISA. PATHOLOGY. INFECTION.

Gross and histopathological changes in intestines, liver, lungs, kidneys, heart and spleen and scanning electron microscopic changes in small intestine of eight crv infected dogs were studied. Dehydration was a significant prominent finding in all the naturally affected dogs with pale mucous membrane and soiled anus. At post-mortem in all the cases, the small intestine particularly the duodenum and jejunum showed moderate to severe congestion and haemorrhages. The most characteristic microscopic lesions were mild to intense congestion of blood vessels in the mucosa and submucosa, degeneration and necrosis of the epithelium at the tip of the villi and clumping and atrophy of the villi. The SEM study in duodenum and ileum revealed thickening and roughening with disruption and distortion of the villi.

**352.** Ingle, Arvind; Advanced Centre for Treatment, Research and Education in Cancer (India). Laboratory Animal Facility. Hosetti, Basaling; Kuvempu University, Kamataka (India). Department of PG Studies and Research in Applied Zoology.. Metastatic behavior of human tumour xenografts in immuno-compromised mouse model. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.192-197 KEYWORDS: LIVER. LUNGS. METASTIGMATA. INVERTEBRATE VIRUSES. MICE. CYTOKINES.

The continued growth of metastatic tumour cells in distant organs, as a result of dissemination of tumour cells from primary site, is a major cause of mortality in human and animal cancer patients. A mechanistic understanding of the metastatic process and development of antimetastatic modalities may bring down morbidity and mortality. The present study was undertaken to study the metastatic behaviour of four types of human tumours in non-obese diabetic-severe combined immunodeficient (NOD SCID) mice. Fresh human tumours of breast, brain, oral cavity and muscle origin collected from the operation theater of the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC) by the

Biorepository Laboratory, ACTREC, were obtained for this study and were implanted surgically under subcutis of the NOD SCID mice. Acceptance of the tumour in these mice was ascertained histologically as well as by PCR using short tandem repeat (STR) methods. Metastases in lungs and liver, if any, was screened histologically and by STR methods. Breast, brain, oral cavity and muscle tumour did not show lungs or liver metastases. However, lungs DNA samples from some of the breast, brain and oral cavity tumour transplanted mice could confirm the presence of circulating tumour cells by PCR method. Further long term studies are required to establish use of SCID mice, for xenografts of histologically intact tissues of serially transplanted tumour, as useful model for study of metastases.

**353.** Reddy, G.B. Manjunatha; Project Directorate on Animal Disease Monitoring and Surveillance, Bengaluru (India). Shivasharanappa, N.; Central Institute for Research on Goats, Makhdoom (India). Animal Health Division Mishra, A.K.; Central Institute for Research on Goats, Makhdoom (India). Animal Health Division Paul, Souvik; Central Institute for Research on Goats, Makhdoom (India). Animal Health Division Sharma, D.K.; Central Institute for Research on Goats, Makhdoom (India). Animal Health Division. Pathology of naturally occurring paratuberculosis in caprine.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.221-223 KEYWORDS: GOATS. PARATUBERCULOSIS. CAPRINAE.

Paratuberculosis is a chronic granulomatous disease caused by an acid fast Mycobacterium avium subsp. paratuberculosis. The present study was conducted to record the morphological and histological changes in naturally occurring caprine paratuberculosis. Out of 28 paratuberculosis suspected morbid cases, 8 showed gross lesions like oedematous and enlarged mesenteric lymph nodes with corrugation of intestinal mucosa. Microscopically, the lesions ranged from small granulomas (Paucibacillary; 3) with few epithelioid cells to large granulomas (Multibacillary; 5) with extensive infiltration of macrophages and epithelioid cells with acid fast organism. The overall post death prevalence of caprine tuberculosis in organized semi-intensive goat farming was 28.75%.

**354.** Krithiga, K.; College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Nair, N. Divakaran; College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Vijayan, N.; College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Anitha, R.; College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology. Mammen Abraham, J.; College of Veterinary and Animal

Sciences, Mannuthy (India). Department of Veterinary Pathology. Lalithakunjamma, C.R.; College of Veterinary and Animal Sciences, Mannuthy (India). Department of Veterinary Pathology.. Pathological changes caused by highly pathogenic *Escherichia coli* infection in pigs. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.224-226 KEYWORDS: *ESCHERICHIA. COLI*. SWINE. SEPTICAEMIA.

Highly pathogenic *Escherichia coli* infection causing septicaemia in pigs is rarely reported. *E. coli* are known to cause wide spread intestinal lesions. Eleven piglets (6 female and 5 male) aged between 3 weeks to 2 months and two adult sows were subjected to detailed necropsy. Necropsy examination revealed mild to severe pulmonary congestion, haemorrhage, edema, emphysema and carnification of the lung tissue in all the cases. Pleurisy and serofibrinous exudate in the thoracic cavity were also recorded in some cases. Apart from these gross changes other changes such as focal pale areas in the myocardium, gastric and intestinal congestion could be observed in some cases. On histopathological examinations, pulmonary lesions such as interstitial edema, congestion, thickening of the alveolar wall, haemorrhages, heart failure cells and fibrinohaemorrhagic pneumonia could be observed in different cases. Other changes such as perilobular fibrosis, atrophy, necrosis and diffuse haemorrhage in the liver could also be observed. Occasionally suppurative myocarditis, wide spread glomerular and tubular necrosis; gastritis and enteritis were also recorded. There was consistent recovery of *E. coli* from the lung tissue samples and occasionally from the heart and liver. In a case showing severe congestion of intestine, *E. coli* could be isolated from the sample collected from the intestine. Pathogenicity studies undertaken in mice with the isolates proved them to be highly pathogenic. Apart from the normal understanding of the *E. coli* causing intestinal lesions, highly pathogenic *E. coli* were isolated from cases showing pulmonary haemorrhage proving them as potential factors to be considered in causing pneumonia in pigs.

**355.** Rout, M.; Project Directorate on FMD, IVRI Mukteswar Campus, Nainital (India). Saikumar, G.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Diagnosis of group A rotavirus infection in piglets by polymerase chain reaction targeting gene segment 6. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.227-229 KEYWORDS: *FAECES. PIGLETS. PCR. ROTAVIRUS.*

The present study was conducted during September 2007 to May 2009 to investigate the prevalence of group A rotavirus (GARV) infection in piglets. A total of 199 necropsied intestinal samples and 96 fecal samples from piglets were collected and tested for group A rotavirus with polymerase chain reaction (PCR) targeting gene segment 6. Out of 199 necropsied intestinal samples, 5 (2.51%)

samples of piglets within 4 weeks of age and out of 96 fecal samples, 16 (16.66%) samples from piglets within 6 weeks of age were found positive for GARV. The results indicate that group A rotavirus is circulating in certain pig populations of Bareilly, Uttar Pradesh.

**356.** Bansal, K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology Singh, C. K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology Ramneek; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Biotechnology Deka, D.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Biotechnology Sandhu, B. S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology Dandale, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology Sood, N.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology. Comparison of TaqMan real time PCR with immunofluorescence for diagnosis of rabies. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.240-242  
KEYWORDS: BRAIN. IMMUNOFLUORESCENCE. RABIES. PCR.

In the present study, sensitivity comparison of TaqMan real time PCR with immunofluorescence on 20 brain samples was evaluated. Primers and probe were synthesized for TaqMan assay on the basis of nucleoprotein gene of rabies virus. TaqMan real time PCR was able to diagnose rabies viral RNA in 13 out of 13 immunofluorescence positive cases. Sensitivity of TaqMan real time PCR was found to be 100% when compared with gold standard test Immunofluorescence. The present study concluded that TaqMan real time PCR can be used as an additional tool on samples like secretions, excretions and skin biopsy for confirmatory diagnosis of rabies.

**357.** Sharma, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Shivasharanappat, N.; CIRG, Mathura (India). Goat Health Division Banerjee, P.S.; Indian Veterinary Research Institute, Izatnagar (India). Division of Parasitology Sahini, Mohini; Indian Veterinary Research Institute, Izatnagar (India). Centre for Wildlife Raut, S.S.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Intestinal coccidiosis in a Nilgai calf (*Boselaphus tragocamelus*). Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.266-268  
KEYWORDS: EIMERIA. INTESTINAL DISEASES. COCCOIDEA. PATHOLOGY. CALVES.

Intestinal coccidiosis was diagnosed histo-pathologically in a one month old Nilgai calf (*Boselaphustragocamelus*) with the history of diarrhoea and haemorrhagic enteritis. Histologically, small intestine revealed necrosis and desquamation of epithelial cells. The cryptic spaces contained aggregations of numerous oocysts and various endogenous developmental stages of *Eimeria* spp. with cellular reaction predominantly comprised of polymorph nuclear cells, lymphocytes, eosinophils and plasma cells. Two types of morphologically distinct oocysts (unsporulated) were identified in the intestinal contents.

**358.** Pathak, K.M.L.; Indian Council of Agricultural Research, New Delhi (India). Chhabra, M.B.; National Research Centre on Camel, Bikaner (India). Trypanosomosis of livestock in India: A review of two decades. *Indian Journal of Animal Sciences (India)*. (Jul 2011) v. 81(7) p. 653-660 KEYWORDS: TRYPANOSOMA EVANSI. LIVESTOCK. INDIA.

Trypanosomosis ranks as the most important haemoprotozoan disease impacting the livestock economy in India through widespread morbidity and mortality. Although prevalent in almost all parts of the country, data from different states showed wide variations being influenced by various epidemiological factors.

**359.** Chakraborty, S. Veeregoda, B.M Project Naik, B.M.C. Rathnamma, D. Venkatesha, M.D. Leena, G. Veeresh, H.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Chakraborty, S.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veeregoda, B.M; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Naik, B.M.C.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Rathnamma, D.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Venkatesha, M.D.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Leena, G.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veeresh, H.; Project Directorate on Animal Disease Monitoring and Surveillance, Bangalore (India). Patil, S.S.; Project Directorate on Animal Disease Monitoring and Surveillance, Bangalore (India).. Molecular characterization and genogrouping of classical swine fever virus isolated from field outbreaks. *Indian Journal of Animal Sciences (India)*. (Aug 2011) v. 81(8) p. 803-806 KEYWORDS: SWINE FEVER VIRUS. EPIDEMICS. GENOMES.

The present study was carried out to characterize classical swine fever virus (CSFV) isolated from field outbreaks in suburban places of Bengaluru, India, using molecular techniques and subsequent genogrouping of the virus. Various tissue samples from CSFV affected pigs (12) were collected and subjected to either virus isolation in PK-

15 cell line, or RNA extraction. PCR amplification was carried out targeting the 5' NTR gene. Subsequent agarose gel electrophoresis yielded specific amplicons of 421 bp obtained from pooled samples of 3 pigs. The PCR purified products were sequenced and subjected to BLAST analysis and subsequently submitted to GenBank. The obtained nucleotide sequences were aligned using MegAlign programme and further subjected to analysis using MEGA 4 programme. All 3 field isolates were found to be grouped into subgroup 2.2 of group 2.

**360.** Sanyal, Prabir Kumar; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Nath, S.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Pal, S.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Mandal, S. C.; Indira Gandhi Krishi Vishwavidyalaya, Raipur (India). Determination of immune reactive proteins in cystic membrane of *Cysticercus tenuicollis* of goat origin. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 822-823 KEYWORDS: GOATS. IMMUNOBLOTTING. IMMUNOLOGICAL TECHNIQUES. IMMUNE RESPONSE. TAENIA HYDATIGENA.

The SDS-PAGE profiles of membrane antigens of *C. tenuicollis* revealed 15 polypeptides bands having MW of 10 –131 kDa. Immunoblotting results revealed bands of 66, 58, 44, 34 and 14 kDa on the nitrocellulose membrane in the anti-membrane goat hyperimmune serum, while the bands of 90, 66, 58, 44, 38, 34, 31 and 14 kDa were noticed in the rabbit anti-membrane hyperimmune serum and 34 and 14 kDa were found in the naturally infected goat serum. Thus bands of 34 and 14 kDa being common could be explored for the diagnosis of *Taenia hydatigena* cysticercosis in goat.

**361.** Dutta, T.K.; Central Agricultural University, Aizawl (India). Roychoudhury, P.; Central Agricultural University, Aizawl (India). Bandyopadhyay, S.; Central Agricultural University, Aizawl (India). Chandra. Rajesh; Central Agricultural University, Aizawl (India).. Detection and characterization of shiga toxigenic *Escherichia coli* from piglets with or without diarrhoea in Mizoram. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 899-903 KEYWORDS: PIGLETS. DIARRHOEA. ESCHERICHIA COLI. MIZORAM.

*Escherichia coli* (774) were isolated from faecal samples of piglets with or without diarrhoea from different districts of Mizoram, India. Virulence genes (*stx1*, *stx2*, *eaeA* and *hlyA*) were detected by multiplex PCR assay. Majority of the isolates were multi-drug resistant. Altogether, 48 serogroups were recorded and O60 was most prevalent. Commonest porcine pathogens under serogroup O8, O103, O108, O138, O141 and O147 were isolated, of which O103 causes haemolytic uremic syndrome in human. Out of 774 isolates, 153 (32.35%) carried at least one virulence gene studied. The

virulence gene profiles of *E. coli* from both diarrhoeic and non diarrhoeic piglets were almost similar. Presence of high rate of coliform bacteria in the healthy and diarrhoeic piglets indicates that these animal species may represent as an important reservoir of these organisms for human infection.

**362.** Ranjan, Rajeev; Birsa Agricultural University, Ranchi (India). Ranchi Veterinary College, Department of Veterinary Pathology. Gupta, M. K.; Birsa Agricultural University, Ranchi (India). Ranchi Veterinary College, Department of Veterinary Pathology. Singh, K. K.; Birsa Agricultural University, Ranchi (India). Ranchi Veterinary College, Department of Veterinary Pathology.. Study of bovine mastitis in different climatic conditions in Jharkhand, India. *Veterinary World (India)*. (May 2011) v.4(5) p. 205-208  
KEYWORDS: BOVINE MASTITIS. MORBIDITY. CLIMATIC FACTORS. BIHAR.

Among 190 milk samples confirmed positive for bovine mastitis by California mastitis test, Somatic cell count and White side test. Among 190 samples, 138 (72.63 %) samples. *Staphylococcus aureus* (27.37%) was found to be the most prevalent organism followed by coagulase negative *Staphylococcus* spp. (12.63%), *E. coli*. (08.95%), *Pseudomonas* spp. (07.89%), *Streptococcus* spp. (05.79%), mixed bacterial infection (04.74%), yeast (03.15%), *Klebsiella* spp. (01.57%) and *Bacillus* spp. (00.52%). Further, the incidence of bovine mastitis was recorded under different climatic conditions, which was found to be highest in winter followed by summer and least in rainy season. Additionally, it was observed that Gram positive organisms were more common cause of bovine mastitis than Gram negative and *Staphylococcus aureus* was most common isolate in all the seasons. Incidence of bovine mastitis has been also recorded under different climatic conditions. However, *Streptococcus* spp. showed a significant rise in incidence during summer. Our results revealed that there was a definite impact of seasonal variation on incidence of bovine mastitis and the microbe associated with it.

**363.** Raveendran, Remya; College of Veterinary and Animal Sciences, Thrissur (India). Priya, P.M.; College of Veterinary and Animal Sciences, Thrissur (India). John, Koshy; College of Veterinary and Animal Sciences, Thrissur (India). Krishnan Nair, G.; College of Veterinary and Animal Sciences, Thrissur (India). Vijayakumar, K.; College of Veterinary and Animal Sciences, Thrissur (India).. Detection of *Mycobacterium avium* subsp. *paratuberculosis* in asymptomatic bovines by IS900 Polymerase Chain Reaction. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 248-249  
KEYWORDS: BOVINAЕ. MYCOBACTERIUM AVIUM. MYCOBACTERIUM AVIUM SUBSP. PARATUBERCULOSIS. PARATUBERCULOSIS. PCR.

Faecal samples were collected from 58 asymptomatic bovines and after DNA extraction IS900 Polymerase Chain Reaction (IS900 PCR) was performed to detect *Mycobacterium avium* subsp. *Paratuberculosis* (MAP). Ten samples (17.24 %) were positive for MAP. The results indicated that the IS900 PCR assay can be used for the early diagnosis of bovine paratuberculosis.

**364.** Mathakiya, R. A.; Anand Agricultural University, Anand (India). Anand Veterinary College.Roy, Ashish; Anand Agricultural University, Anand (India). Anand Veterinary College.Nayak, J. B.; Anand Agricultural University, Anand (India). Anand Veterinary College.. Characterization of *Listeria monocytogenes* isolates by CAMP test. *Veterinary World (India)*. (Jul 2011) v.4(7) p. 301-303 KEYWORDS: LISTERIA MONOCYTOGENES. IMMUNOLOGICAL TECHNIQUES.

In this study, a total 28 *Listeria monocytogenes* field isolates obtained from different animal species were characterized phenotypically by CAMP test. Characterization by CAMP test on all the 28 field isolates revealed positive reaction, of which twenty-three isolates showed characteristics enhancement of haemolytic zone with *S. aureus* on 5 % Sheep Blood Agar (SBA) and five isolates showed weak haemolytic zone.

**365.** Sannat, Chandrahas; College of Veterinary Science and Animal Husbandry, Sardar Krushinagar (India). Department of Microbiology. Sen, A.; IVRI, Mukteshwar (India). National Morbillivirus Referral Laboratory, Division of Virology. Rajak, K.K.; IVRI, Mukteshwar (India). National Morbillivirus Referral Laboratory, Division of Virology.Balamurugan, V.; IVRI, Mukteshwar (India). National Morbillivirus Referral Laboratory, Division of Virology.Singh, R.K. Chandel, B.S.; College of Veterinary Science and Animal Husbandry, Sardar Krushinagar (India). Department of Microbiology.Chauhan, H.C.; College of Veterinary Science and Animal Husbandry, Sardar Krushinagar (India). Department of Microbiology.. Isolation of Peste Des Petitis Ruminants Virus from Small Ruminants in Gujarat. *Indian Journal of Small Ruminants (India)*. (Apr 2011) v. 17(1) p. 64-67 KEYWORDS: SHEEP. GOATS. PEST OF SMALL RUMINANTS VIRUS. ISOLATION.

Peste des petits ruminants virus was isolated from tissues and blood samples of sheep and goats following second passage in Vero cells. Cytopathic effects produced in Vero cells were characterized initially by rounding and ballooning of cells, followed by aggregation of cells, formation of fusion mass and syncytia. Cell lysis was also observed in few cases. Virus isolates were identified using s-ELISA and RT-PCR.

**366.** Manish Kumar; Indian Veterinary Research Institute, Izatnagar (India). Bhilegaonkar, K.N.; Indian Veterinary Research Institute, Izatnagar (India). Agarwal, R.K.; Indian Veterinary Research Institute, Izatnagar (India).. Prevalence and characterization of rotavirus from faecal samples of children and animals. Indian Journal of Animal Sciences (India). (Oct 2011) v. 81(10) p. 993-999 KEYWORDS: ROTAVIRUS. CALF DIARRHOEA ROTAVIRUS. DIAGNOSIS.

Faecal samples (147; 60 bovine calf, 40 children, 47 piglets and pigs) were screened for the presence of rotavirus by RNA-PAGE and RT-PCR. The RT-PCR assay was standardized for the bovine and human rotavirus to amplify VP7 gene of the group A rotavirus. Out of 147 samples, 40 (27.2%) were found positive for rotavirus by RNA-PAGE, whereas only 15 turned out positive by RT-PCR. In bovine calves 21 (35%) and in children 19 (47.5%) cases were positive for rotaviral presence by RNA PAGE, on the contrary, RT-PCR was able to detect 7 cases of bovine (11.66%) and 8 cases of human (20%). We also showed G10 genotyping of rotavirus isolates of bovine origin by PCR. All the samples turned out to be PCR positive indicating that G10 is a predominant genotype responsible for bovine rotaviral diarrhoea in and around Bareilly region. The results indicated that direct detection of rotavirus by RT-PCR from faecal sample was not satisfactory as compared to RNA PAGE, probably due to large product size and sequence variations in rotavirus.

**367.** Sujeet Kumar; Indian Veterinary Research Institute, Izatnagar (India). Chaturvedi, V.K.; Indian Veterinary Research Institute, Izatnagar (India). Kumar, B.; Indian Veterinary Research Institute, Izatnagar (India). Kumar, P.; Indian Veterinary Research Institute, Izatnagar (India).. Immune response and viscosity of haemorrhagic septicaemia oil adjuvant vaccine at different water-oil proportion. Indian Journal of Animal Sciences (India). (Oct 2011) v. 81(10) p. 1000-1004 KEYWORDS: ADJUVANTS. VACCINES. HAEMORRHAGIC SEPTICAEMIA. PASTEURELLA MULTOCIDA. VISCOSITY.

The Office International des epizooties (OIE) and Food and Agriculture Organisation (FAO) recommends the formulation of oil adjuvant vaccine (OAV) against haemorrhagic septicaemia (HS) with water-in-oil ratio of 50: 50. In present study, 3 different OAV were formulated with water-in-oil ratios; 60: 40 (OAV60), 50: 50 (OAV50) and 40: 60 (OAV40). The immune response study was carried out in mouse model for 45 days. Viscosity of the 3 OAV formulations; OAV60, OAV50 and OAV40 were 426.77 centi poise (cP), 222.40 cP and 128.50 cP respectively. Thus, new formulated vaccine, OAV40, having 10 % less aqueous phase recorded 42% low viscosity compared to standard existing vaccine, OAV50. The immune response was quick in higher aqueous phase vaccine OAV60, which showed significant rise in anti Pasteurella multocida specific Log<sub>10</sub>

ELISA titer on 14 th 4 days post-immunization (DPI) and peak titer on 21 DPI. But vaccine with higher oil phase, such as OAV50 and OAV40, had late but significantly higher and sustained antibody titer up to 45th DPI. All the 3 OAV formulations was protective as it produced 100% protection at 100 LD50 and 60 to 80% protection at 1000 LD 50 and 10000 LD 50 , after challenge on 45 th DPI. These results indicated that higher oil proportion in emulsions was effective in reducing viscosity and inducing higher level of sustained antibody response without compromising protection.

**368.** Jain, Neeraj; National Dairy Development Board, Hyderabad (India). Trangadia, Bhavesh; National Dairy Development Board, Hyderabad (India). Rana, Samir Kumar; National Dairy Development Board, Hyderabad (India). Muraleedharan P; National Dairy Development Board, Hyderabad (India).. Cytokines expression profile of Brucella abortus infected Indian water buffaloes. Indian Journal of Animal Sciences (India). (Oct 2011) v. 81(10) p. 1010-1012  
KEYWORDS: WATER BUFFALOES. BRUCELLA ABORTUS. BRUCELLA. CYTOKINES. PCR.

In the present study investigation was carried out on the expression of cytokines in buffaloes infected with Brucella abortus. The study included, groups 1 and 2 of buffaloes each containing 5 of Brucella sero-positive buffaloes with history of abortions and sero-positive with no history of abortions respectively. Group 3, comprised 3 Brucella seronegative buffaloes without history of abortion, and was considered as negative control. The transcript levels of IFN- $\alpha$ , TNF- $\alpha$ , IL-2, IL-8 and IL-12 were analyzed using Taq-Man real-time polymerase chain reaction in blood cells of all animals. While comparing the levels of cytokines among these groups of animals, only TNF- $\alpha$  and IL-12 transcripts showed a significant (P 0.05) decrease in animals of group 1 as compared to group 2. However, no significant difference was recorded in the levels of expression of remaining cytokines among the groups. These findings are perplexing and warrants an in depth analysis with large number of samples, to elucidate the complex interaction of various cytokines in immune response due to natural Brucella infection in Indian water buffaloes.

**369.** Vasudeva, Kiran; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Chachra, Deepti; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Arora, A.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Chandra, Mudit; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Sood, N.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Rai, T.S.; Guru Angad Dev University of Veterinary

and Animal Sciences, Ludhiana (India). Sharma, N.S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. Phagocytic uptake and killing of *Pasteurella multocida* B: 2 by mouse peritoneal phagocytic cells. Indian Journal of Animal Sciences (India). (Oct 2011) v. 81(10) p. 1013-1017 KEYWORDS: PASTEURELLA MULTOCIDA. PHAGOCYTOSIS.

The phagocytic uptake and killing of *Pasteurella multocida* B: 2 field isolates (n, 9) and vaccine strain (P52) by mouse peritoneal phagocytic cells, in the absence and presence of opsonization was evaluated using in vitro phagocytosis and bactericidal assays. Opsonization either with hyperimmune serum or normal serum caused a nonsignificant increase in the percentage of phagocytosis over non-opsonized bacteria (P0.01) in all the *P. multocida* B: 2 isolates including P52. It was observed that 99% of the bacteria were killed within 15 min of incubation, irrespective of the serum used. There was a static increase in cfu counts by ~ 5 log at the end of the assay at 240 min. The study revealed that opsonization did not alter the phagocytic uptake and the bacteria were efficiently phagocytosed and killed in vitro under different conditions.

#### **L74 Miscellaneous animal disorders**

**370.** Palanivel, K.M.; Tamil Nadu University of Veterinary and Animal Sciences, Kattupakkam (India). Livestock Research Station.Sathivelan, S.M.,; Tamil Nadu University of Veterinary and Animal Sciences, Kattupakkam (India). Livestock Research Station.Gopinathan, A.; Tamil Nadu University of Veterinary and Animal Sciences, Kattupakkam (India). Livestock Research Station.Sriram, S.K.,; Tamil Nadu University of Veterinary and Animal Sciences, Kattupakkam (India). Livestock Research Station.Kumarasamy P.; Tamil Nadu University of Veterinary and Animal Sciences, Kattupakkam (India). Livestock Research Station.. Incidence of Mortality among Swine Due to Classical Swine Fever-Postmortem Findings. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 86-88 KEYWORDS: SWINE FEVER. SWINE. MORTALITY.

Mortality reported due to classical swine fever among pigs at Livestock Research Station, Kattupakkam, maintained under modern barns with concrete floors and located in the semi-arid tropical region have been analysed. Two (3.9%) out of 57 pigs died due to classical swine fever between May 2008 to April 2009. The other cause specific deaths amongst these pigs were due to acute enteritis, acute pneumonia, interstitial pneumonia, tubular nephritis and crushing. Clinical signs included erythema of the skin of the ears, abdomen and medial thighs and greenish diarrhea. Postmortem lesions like enlarged and button shape ulcers in the intestines, multifocal hemorrhages of the spleen and petechial hemorrhages on

the kidney and infiltration of mononuclear cells in the mucosa and sub mucosa formed necrotic areas of the intestine, infarcts and shrinkage of glomerular tufts were the significant pathognomonic lesions of CSF.

**371.** Prabhakar, S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Brar, P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Behl, K.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Singh, A.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Reproductive patterns, treatment response and fertility in dystocia affected dairy buffaloes developing postpartum metritis. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 556-559 KEYWORDS: WATER BUFFALOES. DYSTOCIA. FERTILITY.

Buffaloes (28) suffering from dystocia, presented at University Veterinary Clinics were studied postpartum for reproductive patterns, evaluation of treatment response and fertility. The animals were periodically followed up to day 42 after discharge from the hospital. All the animals had developed varying degrees of postpartum metritis. Based on the type of treatment, the buffaloes were randomly divided into group 1(8 buffaloes subjected to antibiotics alone), group 2 (12 buffaloes given both antibiotics and prostaglandin) and group 3 (8 buffaloes administered prostaglandin). The broad spectrum antibiotics were given for 5 consecutive days immediately after parturition. In group 2, prostaglandin was additionally administered (lutalyse 25 mg) on day 5, while in group 3, injection prostaglandins were administered on day 5 and 12 postpartum. Vaginal discharges, localization and size of uterine horns and ovarian activity were studied through per-rectal examination and later confirmed ultrasonographically. The response to double prostaglandin administration was better in respect of all the parameters for clearing of uterine tract infections. The vaginal discharge disappeared by day 14 and became odorless. The uterine involution, days to first estrus and conception and services/conception were significantly lower in group 3. In conclusion, occurrence of uterine infections and metritis was a common finding in all handled cases of dystocia. Addition of prostaglandins in the treatment protocol proved highly beneficial to clear uterus of infections, enhance uterine involution and initiate ovarian activity in the dystocia affected buffaloes.

**372.** Verma, S.K; DUVASU, Mathura (India). Department of Veterinary Pathology. Srivastava, A.K.; DUVASU, Mathura (India). Department of Veterinary Pathology. Gangwar, N.K.; DUVASU, Mathura (India). Department of Veterinary Pathology.. Pathomorphological changes

induced by Datura stramonium seed toxicity in rats. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.164-167  
KEYWORDS: DATURA. TOXICITY. RATS. SEED.

In this study, 63 rats of either sex, aged 4 weeks were randomly divided into three groups comprising 21 animals in each. The animals of group I provided distilled water and served as control, group II were provided Datura Eltramonium seed extract 000 mg! kg body weight and group ill were administered Datura stramonium seed extract000mg/ kg body weight orally for 90 days. Seven rats were slaughtered at the intervals of 30, 60 and 90 days in each group for further study. Pathomorphologically, the size of brain of groups II and ill was comparatively smaller with congestion in meninges and choroid plexus and showed lesions of spongiosis, perineuronal and perivascular oedema. Liver of rats of group-II and group-ill were slightly enlarged and showing degenerative changes in the hepatocytes, dilated and congested sinusoids. Kidneys of rats of group-II and group-ill showed degenerative changes in tubules and presence of eosinophilic granular excretions retained in the tubular lumens. There was variable sized nodule in the lungs of rats of group-II and ill at 90 days of intervals showing presence of large flat squamous pleomorphic cells with hyperchromatic nuclei arranged irregularly in the alveolar lumens, at places degeneration, indicated lesions of pneumocytocarcinoma. Mild to moderate vacuolization and degenerative changes in cardiac myofibres at various intervals were observed. Testes showed congestion of scrotal plexus, excessive accumulation of watery fluid appearing as pink coloured homogeneous mass in the interstitial spaces.

**373.** Pallavi, G.; Veterinary Science, Hyderabad (India).Kumar, A Anand; Veterinary Science, Hyderabad (India). Department of Pathology.Madhuri, D.; Veterinary Science, Hyderabad (India). Department of Pathology.Reddy, A. Gopala; Sri Venkateswara Veterinary University, Hyderabad (India). College of Veterinary Science, Department of Pharmacology &Toxicology.Reddy, M.R.; Project Directorate on Poultry, Hyderabad (India).. Pathology of gama-cyhalothrin toxicity and its amelioration in rats.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.168-173  
KEYWORDS: RATS. TOXICITY. CYHALOTHRIN.

A total of 32 female Sprague - dawly rats were divided into four equal groups. Group 1 served as control, Group 2 toxic control received gama-cyhalothrin-mg / kg body weight orally every alternative day for 4 weeks. Group 3 was treated with N-acetyl cysteine (NAC control) 00mg/kg bodyweight per day orally for 4 weeks, Group 4 rats received gama-cyhalothrin mg/kg body weight every alternative day for 4 weeks and N-acetyl cysteine 00mg/kg body weight per day orally for 4 weeks. Reduced feed and water

intake, hyperesthesia, mild salivation, incoordination, hunched posture and discomfort, stretched hind limbs, piloerection, erect tails, thick eye discharge were observed in group 2 animals. Significant decrease (P0.05) in total erythrocytes count (TEC), hemoglobin (Hb), packed cell volume (PCV) and total protein. Significant (P0.05) increase in alanine transaminase (ALT), creatinine phosphokinase (CPK), lactate dehydrogenase (LDH), serum creatinine activity in group 2 on 14 and 28 days was observed. Co administration of N-acetyl cysteine showed significant improvement in all parameters in comparison to toxic control (group 2). Grossly, atrophied liver, kidney, presence of pale necrotic foci throughout parenchyma, liver, medullary congestion in kidney and histologically, congestion, bile duct hyperplasia and centrilobular necrosis in liver, marked degenerative changes in tubules with presence of intertubular haemorrhages in kidney, vacuolation, neuronal degeneration and chromatolysis in brain, severe degeneration, necrosis of muscle fibres in heart and marked disruption, loss of striations with mild haemorrhages in muscle were observed in group rats. In group 4 rats, liver, kidney and heart revealed mild to moderate degenerative changes. The tissue enzymes assays revealed a significant (P0.05) increase in TBARS, protein carbonyles and significant (P0.05) decrease of GSH, GST and Na<sup>+</sup>K<sup>+</sup>ATP ase activities in group 2. In groups 1 and 3 the values were within the normal range. The ameliorative group showed mild to moderate improvement in all parameters in comparison to group 2. The study indicated that exposure to A-cyhalothrin resulted in neurotoxicity and cytotoxicity. NAC supplementation provided protective action and improvement in histological and oxidative parameters.

**374.** Amaravathi, P.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Srilatha, Ch.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Ramadevi, V.; College of Veterinary Science, Gannavaram (India). Department of Veterinary Pathology. Sreenivasulu, D.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Prasad, P. E.; College of Veterinary Science, Tirupati (India). Department of Veterinary Biochemistry. Sujatha, K.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Sailaja, N.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Neuroimmunotoxicity of Bisphenol A in rats. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.174-178  
KEYWORDS: IMMUNOSUPPRESSANTS. IMMUNOSUPPRESSION. RATS.

Bisphenol A (BPA) is one of the common environmental endocrine disruptors with estrogenic properties and is the building block of

carbonate plastic and a component of resin coatings. The present experiment was designed to make a systematic study of experimentally induced BPA toxicity in both male and female Wistar albino rats at 500 and 250 mg/kg b.wt. to groups n, Vand III, VI respectively by mixing in sunflower oil for 12 weeks, with the objectives of finding out the effect of BPA on nervous system and immune system. Significant ( $P < 0.05$ ) decrease in acetyl cholinesterase activity was noticed in BPA treated groups when compared to controls. Immunosuppression was indicated by significant ( $P < 0.05$ ) decrease in HA titer (log) and DNCB contact sensitivity score of BPA treated groups when compared to control. Submeningeal and cerebral hemorrhages and spongiosis, swollen neurons with severe degenerative changes, extensive glial cell proliferation, severe demyelinating changes, microgranuloma formation with proliferation of capillaries and endothelial cells were more prominent in cerebral cortex of majority of BPA treated rats in a dose dependent manner. Cerebellum of rats revealed shrinkage and focal loss of Purkinje cells, rounding and tapering of Purkinje cells, spongiosis in molecular layer in majority of animals at the end of 10th to 12th weeks in BPA treated groups. Depletion of lymphocytes in spleen, lymph node and thymus were noticed in all BPA treated rats in dose dependent manner. Ultra structurally, granular mitochondria because of degeneration of cristae, degeneration of ER, vacuolation in cytoplasm and fragmented chromatin in astrocytes and numerous vacuoles in cytoplasm with disrupted nuclear membrane and condensation of chromatin in microglial cells were noticed in brain of BPA treated rats.

**375.** Doltade, Sagar A.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pharmacology & Toxicology. Raut, Sachin; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Badgular, Prarabdh C.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pharmacology & Toxicology. Chandratre, Gauri; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Kurade, Nitin P.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Telang, A.G.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research & Diagnosis.. Haemato-biochemical and histopathological changes following sub-acute exposure to acetamiprid in male Wistar rats. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.179-182  
KEYWORDS: HAEMATOBIA. HISTOPLASMA. RATS.

Indiscriminate use of pesticides has elevated the risk of contamination of environment. Acetamiprid (ACE), a member of neonicotinoid synthetic chlorinated insecticide family is a new insecticide that has recently introduced in the market. The use of

acetamiprid against a wide range of insects, both in agricultural and domestic areas, is very common. Present study was undertaken to investigate haemato-biochemical and histopathological changes in male Wistar rats after subacute exposure to acetamiprid. Male Wistar rats were divided into three groups. Group I (control) and II (vehicle control) were administered distilled water and groundnut oil, respectively. Group III was administered acetamiprid (1/10 L O.S.) 52.50 mg/kg body weight. Administration of acetamiprid (52.50 mg/kg p.o.) for 28 days resulted in significant decrease in Hb, TEC and non-significant decrease in PCV values. There was significant increase in ALT, AST, LOH and Creatinine kinase levels in serum. Acetamiprid treatment caused histopathological changes in liver and kidney of rats. In liver moderate degenerative changes, individual cell necrosis and karyomegaly were noticed. In kidneys mild glomerular oedema, congestion, desquamated lining epithelial cells were observed.

**376.** Patel, A.V.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Joshi, B.P.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Undhad, V.V.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Dhaval, F.T.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Gupta, Hemant; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Jivani, B.M.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Ghodasara, D.J.; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Prajapati, K.S. ; Anand Agriculture University, Anand (India). College of Veterinary Science and AH, Department of Veterinary Pathology. Haemato-biochemical and pathological studies of alpha-hexyl cinnamic aldehyde toxicity in Wistar rats. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.187-191 KEYWORDS: HAEMATOBIA. PATHOLOGY. WISTERIA. RATS.

The present study was conducted to evaluate the repeated dose dermal toxicity of alpha-hexyl cinnamic aldehyde (HCA) in male and female Wistar rats. The animals were divided into four different groups each comprising five male and five female rats. The group I served as control and was applied with isopropyl alcohol (2 ml/kg BW) while groups II, III, and IV were acted as treatment groups and HCA was applied topically at the dose rate of 170 mg/kg (low dose), 340 mg/kg (medium dose) and 680 mg/kg (high dose), respectively,

for fourteen consecutive days. The clinical signs like erythema and hyperirritability were noticed in all the three treatment groups with lower severity in group II and highest in group IV rats. Among different haematological parameters studied, there was significant reduction in lymphocytes as well as significant increase in neutrophils, eosinophils and monocyte count in male and female rats belonged to group III and IV and no effect on erythrocyte related values. Significant decrease in total protein, albumin, glucose and triglyceride as well as increase in AST and ALT was observed in group IV rats as compared to control group. There was no alteration in kidney parameters such as creatinine, protein, sodium, potassium and chloride in treatment groups as compared to the control. There was rough, dry and thick skin along with crust formation in rats belonged to medium and high dose group. The histological lesions in the skin revealed thickening of epidermis, hyperkeratosis, hyperplasia of stratum germinativum, presence of necrotic debris in cornified layer and hyperplasia of sebaceous glands. The lesions were more pronounced in high dose group than in medium dose group.

**377.** Thakor, K.B.; Anand Agricultural University, Anand (India). Anand Veterinary College, Department of Veterinary Pathology. Dave, C.J.; Anand Agricultural University, Anand (India). Anand Veterinary College, Department of Veterinary Pathology. Fefar, D.T.; Anand Agricultural University, Anand (India). Anand Veterinary College, Department of Veterinary Pathology. Jivani, B.M.; Anand Agricultural University, Anand (India). Anand Veterinary College, Department of Veterinary Pathology. Prajapati, K.S.; Anand Agricultural University, Anand (India). Anand Veterinary College, Department of Veterinary Pathology.. Pathological and molecular diagnosis of naturally occurring inclusion body hepatitis-hydropericardium syndrome in broiler chickens.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.212-216 KEYWORDS: BROILER CHICKENS. HEPATITIS. DIAGNOSIS. PATHOLOGY. SYMPTOMS.

Natural cases of inclusion body hepatitis were noticed in broilers of 2-4 weeks of age around Anand district of Gujarat state. There was 2.75-11.66% varying mortality in birds died due to inclusion body hepatitis-hydropericardium syndrome in different poultry farms. During the post mortem examination, grossly liver was found enlarged and mottled with few necrotic foci. Hydropericardium was observed in all most all the cases. In some cases there were pericardial hemorrhages. Microscopically examination revealed basophilic, eosinophilic, intranuclear inclusion body in affected hepatocytes. Avian adeno virus was also isolated from liver samples collected in 20% glycerol saline of two naturally infected broiler chicken farms. Testing of the liver samples yielded expected size product of 890 bp. PCR products of both samples were subjected to

DNA sequencing and the phylogenetic analysis revealed different matching percentages ranging from 94-95% with other fowl adenoviruses. Both of the viral isolates were found to group with Fowl adenovirus 12 strain 380 and Fowl adenovirus 11 strain C2B.

**378.** Singh, Dharmendra; DVVASV, Mathura (India). Department of Veterinary Pathology. Srivastava, A.K.; DVVASV, Mathura (India). Department of Veterinary Pathology. Gangwar, Neeraj Kumar; DVVASV, Mathura (India). Department of Veterinary Pathology Singh, Pratima; DVVASV, Mathura (India). Department of Veterinary Pathology. Pathomorphological changes induced by cypermethrin toxicity in broilers and its amelioration with vitamin E. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.217-220  
KEYWORDS: BROILER CHICKENS. CYPERMETHRIN. VITAMIN E.

45 broilers of either sex, aged 2 weeks were randomly divided into three groups comprising 15 birds in each. The birds of group I provided coconut oil and served as control and group II were administered Cypermethrin 00mg/ kg body weight orally with vehicle coconut oil and group III were administered Cypermethrin 00mg/ kg with Vitamin E 50mg/ kg body weight orally for 30 days. Five broilers from each group were slaughtered at the intervals of 10, 20 and 30 days for further study. Pathomorphologically birds of group-II revealed presence of grayish white multiple focal necrotic spots in liver and showed cellular swelling to vacuolisation and focal areas of necrosis of hepatocytes along with congestion and lymphoid aggregation in portal areas. Lungs showed focal area of consolidation and marked congestion of air vesicles. The lumen of air vesicles and parabronchi also had variable amount of light pink colour oedematous fluid. Kidney revealed hypercellularity of glomeruli and infiltration of mononuclear cells and degenerative changes in the lining epithelium of renal tubules. Epicardial surface of the heart showed congestion and at places petechial to ecchymotic, subepicardial hemorrhages and degenerative changes in myofibres. Proventriculus revealed degeneration and desquamation of the mucosa epithelial lining with focal area of necrosis forming ulcers. Intestine revealed diffuse degeneration and necrosis desquamation of villous epithelium forming naked villi. The brain revealed mild to moderate congestion of blood vessels and cerebral cortex showed central chromatolysis in neurons and perineuronal edema. Cerebellum revealed separation of molecular and granular layers. The bursa of Fabricius showed degeneration and necrosis of lymphoid tissue in the bursal follicles and hyperplasia of epithelium lining the bursa. The caecal mucosa showed hyperplasia of goblet cells with mild degeneration of lymphoid cells from tonsils. Similar gross and microscopic picture were observed in the birds of group-III but of mild in nature.

**379.** Kokila, S.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Veena, P.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Suresh Kumar, R.V.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Sankar, P.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Dhana lakshmi, N.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Srilatha, Ch.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Pathology. Selvaraj, R.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology.. Hepatoid adenocarcinoma of anal region in a dog. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.236-237 KEYWORDS: DOGS. CYTOKINES. LIVER DISEASES. ADENOMA.

Lemon sized growth was noticed in the right side of the anal opening in a 10 year old mongrel dog. The fine needle aspiration biopsy revealed polygonal cluster of cells with multiple nucleoli. Histopathological examination revealed islands of tumor cells separated by vascularized connective tissue stroma. Based on the gross and histopathological observations, the tumor was diagnosed as hepatoid adenocarcinoma.

**380.** Madheswaran, R.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology, Ethics and Jurisprudence. Sivaseelan, S.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology, Ethics and Jurisprudence. Ponnusamy, K.K.; Veterinary College and Research Institute, Namakkal (India). Balasubramaniam, G.A.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology, Ethics and Jurisprudence. Arulmozhi, A.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology, Ethics and Jurisprudence. Balachandran, P.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology, Ethics and Jurisprudence. Clinicopathological assessment of cutaneous multicentric lymphoma in a dog.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.238-239 KEYWORDS: LYMPHOMA. CANINE ADENOVIRUS. CYTOLOGY. HISTOPATHOLOGY. DOGS. SKIN GLANDS. HAEMATOBIA.

A case of cutaneous multicentric lymphoma was observed in a 2-

year-old male mongrel dog. The dog was brought to the small animal clinic with the history of anorexia and vomiting. Clinical examination of the dog revealed no abnormality except generalized lymphadenopathy. Haematological parameters revealed altered blood pictures and significantly elevated leucocyte count due to neutrophilia. Serum biochemistry parameters did not reveal any abnormality. Microscopical examination of fine needle aspiration smears revealed predominantly lymphoblasts and few lymphocytes. Cytoplasm of the neoplastic cells was bluish in colour, granular in appearance and had numerous vacuoles and fragments. Nuclei were round to oval, occasionally elliptical and often irregular in shape with numerous mitotic figures. Histologically, abundant cell population consisting of mature lymphocytes and few lymphoblasts were observed. Neoplastic cells were round with moderate cytoplasm. Nuclei were spherical and hyperchromatic with prominent central nucleoli. Cytology and histopathology findings were consistent with the diagnosis of canine cutaneous multicentric lymphoma.

**381.** Adak, A.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Prasad, M.C.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Lonkar, P.S.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Kapurkar, U.M.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Brahmanekar, M.G.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Patel, M.V.; Jai Research Foundation, Gujarat (India). Pathology Section, Department of Toxicology. Testicular hydrops in Wistar rat - A case report.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.243-244  
KEYWORDS: MALE GENITAL DISEASES. SORPTION. WISTERIA.

A case of bilateral testicular hydrops has been reported in a 26 months old male Wistar rat out of over 20 thousand Wistar rats necropsied over the period. Grossly, both the testes were enlarged and testicular parenchyma was floating amidst the pool of fluid present inside the tunica albuginea/capsule. Histomorphology exhibited marked interstitial oedema with marked reduction in the number of cut sections of seminiferous tubules showing degenerative/atrophic changes. The exact etiology could not be ascertained.

**382.** Agarwal, Seema; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary & Animal Sciences, Department of Pathology. Agarwal, D.K.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary & Animal Sciences, Department of Pathology. Effect of chemical industry effluent on macrophage functions of mice.. Indian

Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.245-246  
KEYWORDS: CHEMICAL COMPOSITION. WASTEWATER. MICE.

To study the effect of chemical industry effluent on macrophage functions in mice, 128 mice of 2 weeks age were procured and divided into four equal groups. These mice were vaccinated with Ranikhet disease vaccine (R,B) strain intraperitoneally .1ml and were treated with chemical industry effluent as drinking water for 4 months. The functional activity of macrophages was assessed by nitroblue tetrazolium reduction assay. The test was conducted at 90 days and 120 days of experiment. The results indicated a significant depression of macrophage functions as evidenced by a reduction in NBT positive cells in chemical industry effluent treated mice at 90 days and 120 days a/experiment in comparison to controls. This depression of macrophage activity may result in increased susceptibility of host to various infections.

**383.** Prasad, M.C.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Brahmanekar, M.G.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Kapurkar, U.M.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Adak, A.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Lonkar, P.S.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Patel, M. V.; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Pavitrakar, Vishal; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Hokan, Sanjay; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section Sharma, Sharad; Jai Research Foundation, Gujrat (India). Department of Toxicology. Pathology Section. Pathology of epidermoid cyst in the spinal cord of swiss albino mice.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.247-248  
KEYWORDS: EPIDERMOPHYTON. CYSTEINE. HISTOPATHOLOGY. MICE. SPINAL CORD.

Two cases of epidermoid cyst were recorded one each in male and female Swiss albino mice (3-4 months) out of about 2000 mice used in [various toxicity studies. These were located in the white matter of lumbar segment of spinal cord. No clinical sign during life phase and gross lesion on necropsy were recorded. Histopathological features consisted of multilayered stratified squamous epithelial cystic wall having either keratinaceous debris or concentric laminated layers of keratin in the lumen. It was considered to be an incidental finding of mgenital origin.

**384.** Ahamad, D. Basheer; TANUV AS, Thanjavur (India). Veterinary University Training and Research Centre. Punniampurthy, N.; TANUV AS, Thanjavur (India). Veterinary University Training and Research Centre. Sakthivelan, S.M.; TANUV AS, Thanjavur (India). Veterinary University Training and Research Centre. Ranganathan, V.; TANUV AS, Thanjavur (India). Veterinary University Training and Research Centre,. Spontaneous occurrence of luteoma and uterine adenocarcinoma in the reproductive tract of a rabbit. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.249-251  
KEYWORDS: HISTOPATHOLOGY. RABBITS. UTERINE DISEASES. ADENOMA.

Adetailed postmortem examination of two and a half year-old female Dutch breed rabbit carcass was carried out. The rabbit had a history of anorexia, depression and prolonged estrus over a period of about 3 months. Grossly, a yellowish pink and soft growth was found in the right ovary. The uterus showed multi nodular yellowish white, soft and firm growth. Cytological observations of ovarian and uterine growth were most suggestive of a neoplasm of epithelial cell origin. Histologically, the ovarian and uterine growths were diagnosed as luteoma and endometrial adenocarcinoma respectively.

**385.** Gowthaman, V.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology, Avian Diseases Section. Singh, S.D.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology, Avian Diseases Section. Dhama, K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology, Avian Diseases Section. Barathidasan, R.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology, Avian Diseases Section. Ramakrishnan, M.A.; Indian Veterinary Research Institute, Mukteswar (India). Division of Virology.. Unusual occurrence of haemorrhagic anaemia syndrome in broilers. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.252-254  
KEYWORDS: ANAEMIA. HAEMORRHAGE. BROILER CHICKENS.

Disease investigation was carried out in an 18 weeks-old pre-layer poultry farm having unusual mortality in Namakkal poultry belt. Necropsy was carried out on freshly dead and ailing birds. Tissue samples such as trachea, lungs, air sacs and liver were collected for pathological studies and direct tissue PCR. The general clinical signs consisted of depression, huddling, ruffled feathers, reduced feed intake and water consumption, uneven growths, hock sitting posture, and respiratory distress. General appearance of the carcass was highly pale, anemic, and icteric. Skeletal muscles were highly pale and severe multifocal intramuscular haemorrhages were noticed in the breast, leg and thigh muscles. Widespread petechial haemorrhages could be observed on the surface of proventricular glands and at junction of proventriculus and gizzard. The liver, kidney

and bone marrow were highly pale and icteric. The pulmonary alterations consisted to loss of mucosal gland activity in trachea, extensive haemorrhages in the air and blood capillaries of lung. Air sacs were thickened due to inflammatory infiltration and fibrinohaemorrhagic exudates. Mucosal folds of proventriculus showed haemorrhages and lamina propria infiltrated with inflammatory cells. Chicken anaemia virus (CAV) nucleic acid was detected by PCR in pooled samples of lung, trachea and liver. The disease was a unique case of haemorrhagic anaemia syndrome in a 18 week pre-layer flock, which strongly suggest that CAV causes clinical disease in pre-layer birds. Generally clinical form of CAV in adult birds is a rare phenomenon.

**386.** Sawale, G.K.; Bombay Veterinary College, Mumbai (India). Department of Pathology Gupta, S. C.; Indovax Pvt. Ltd, Research and Development Unit, Gurgaon (India). Sivastava, P.K; Indovax Pvt. Ltd, Research and Development Unit, Gurgaon (India). Sabale, S.S.; Bombay Veterinary College, Mumbai (India). Department of Pathology Ingole, K.H.; Bombay Veterinary College, Mumbai (India). Department of Pathology Pawale, N.H.; Jaffa Feed, Nasik (India). More, B.K.; KNP College of Veterinary Sciences, Shirwal (India).. Inclusion body hepatitis-hydropericardium syndrome in commercial broiler chickens.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.255-257 KEYWORDS: BROILER CHICKENS. SYMPTOMS. HEPATITIS.

Five cases of Inclusion body hepatitis (ffiH) – hydropericardium syndrome (HPS) were investigated in commercial broiler chickens of 15-37 days age in Maharashtra state, India. Grossly, livers were enlarged and mottled with a reticular pattern on its surface. Hydropericardium was also observed in few cases. Mortality ranged from negligible to as high as 10% in the studied flocks. In all the cases, intranuclear basophilic inclusion bodies were observed in the hepatocytes along with fatty changes and mononuclear cell infiltration around portal triads. The disease was diagnosed on the basis of histopathological examination, agar gel precipitation test, isolation of virus and demonstration of inclusion bodies in liver cell culture using Macchiavello's technique.

**387.** Kumar, Upendra; DUV ASU, Mathura (India). Department of Veterinary Pathology. Srivastava, A.K.; DUV ASU, Mathura (India). Department of Veterinary Pathology. Kumar, Sanjiv; DUV ASU, Mathura (India). Department of Veterinary Pathology. Gangwar, N. K.; DUV ASU, Mathura (India). Department of Veterinary Pathology. Pathomorphological changes induced by chlorpyrifos in broilers and their amelioration with selenium. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.262-265 KEYWORDS: BROILER

#### CHICKENS. CHLORPYRIFOS. SELENIUM.

A total of fifty four broilers aged 25 days were randomly divided into three equal groups. The chlorpyrifos was given 3 mg/kg body weight orally daily in birds of group-II and group-III. The feed of the birds of group-III was supplemented with sodium selenite. 25ppm. The birds of the group-I were kept as control. Six broilers from each group were slaughtered at day 14, 28 and 42. The weight of lungs, heart, kidneys, brain and spleen was found to be significantly lower in group-II and group-III as compared to control group-I. In group II birds, there were degenerative to necrotic changes in liver. Lung showed congestion, oedema, focal consolidation, extravasation of erythrocytes with inflammation and occasionally giant cells formation. Kidneys showed mild to moderate congestion with degenerative changes in the tubular epithelium and glomerular tufts with or without hypercellularity. Heart showed congestion, extravasation of erythrocytes and degenerative necrotic changes of myofibres. Proventriculus showed degeneration and desquamation of epithelial lining of the mucosa with or without inflammatory cells. Intestine showed mucinous degeneration and necrosis at the tip of the villi. Perivascular and perineuronal oedema, satellitosis and spongiosis were seen in brain. Mild depletion of lymphoid cells in malpighian corpuscles of spleen and in follicles of bursa of Fabricius were also observed. Similar mild morbid lesions except pneumonia and myocarditis were also recorded in birds of group III administered sodium selenite: 25 ppm in feed which suggested ameliorative effect of antioxidants on the parenchymatous organs and other body tissues.

**388.** Suvaneeth, P.; KVASU, College of Veterinary and Animal Sciences, Thrissur (India). Department of Veterinary Pathology. Divya, C.; KVASU, College of Veterinary and Animal Sciences, Thrissur (India). Department of Veterinary Pathology. Nair, N.D.; KVASU, College of Veterinary and Animal Sciences, Thrissur (India). Department of Veterinary Pathology. Vijayan, N.; College of Veterinary and Animal Sciences, Pookode, Wayanad, Kerala (India). Department of Veterinary Pathology. Heat stroke in king cobra (*Ophiophagus hannah*) - A case report.. Indian Journal of Veterinary Pathology (India). (Dec 2012) v.36(2) p.269-270 KEYWORDS: HEAT. CARDIOVASCULAR DISEASES. HISTOPATHOLOGY. SNAKES.

An unusual case of heat stroke observed in a King Cobra is being reported. The snake was brought for postmortem with a history of sudden death. Detailed necropsy revealed marked congestion of various organs. Histopathological observations supported haemorrhages in various organs and vascular stasis resulting in stagnant anoxic death. Overall observations with the high temperature climate of the region during the days confirmed it as a

case of heat stroke.

**389.** Ali, Sarfraj; Indira Gandhi Agricultural University, Durg, (India). Awasthi, M.K.; Indira Gandhi Agricultural University, Durg, (India). Khan, J.R.; Indira Gandhi Agricultural University, Durg, (India). Tiwari, R.P.; Indira Gandhi Agricultural University, Durg, (India). Influence of blood metabolites and metabolic hormones on response and conception in postpartum Sahiwal cows after Ovsynch treatment. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 665-668 KEYWORDS: COWS. PERINATAL PERIOD. THYROXINE. TRIIODOTHYRONINE. REPRODUCTIVE PERFORMANCE.

Present investigation was conducted to investigate the influence of blood metabolites and metabolic hormones on conception after Ovsynch treatment in postpartum Sahiwal cows. Experimental animals (12) were randomly divided into 2 groups, of 6 animals each. Animals of group 1 were treated with traditional Ovsynch protocol beginning on day 60 postpartum (day 0 of Ovsynch protocol), while animals of group 2 were treated with a modified Ovsynch protocol, where first GnRH injection was replaced with hCG. Treated animals were inseminated at fixed time between 14 and 20 h after second GnRH injection without estrus detection. Blood samples were collected from each experimental animal on days 50, 60 and 68 postpartum; and blood glucose and serum concentrations of non-esterified fatty acid (NEFA), insulin, tri iodothyronine (T3) thyroxin (T4) and progesterone (P4) were determined. Non-conceived animals recorded significantly higher mean serum NEFA concentration than in conceived animals on days 50, 60 and 68 postpartum. Conceived animals had significantly higher blood glucose concentration on day 68, significantly higher serum insulin concentration on days 50, 60 and 68, significantly higher serum T4 concentration on days 60 and 68 and significantly higher serum T4 concentration on day 60 postpartum than in non-conceived animals. From the present study, it may be concluded that decreased serum NEFA concentration and an increased level of blood glucose and serum concentrations of insulin, T3 and T4 probably favoured to achieve conception in Ovsynch treated postpartum Sahiwal cows.

**390.** Malik, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Singh, Pardeep; Central Institute for Research on Buffaloes, Hisar (India). Sharma, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Singh, Inderjeet; Central Institute for Research on Buffaloes, Hisar (India). Phulia, S.K.; Central Institute for Research on Buffaloes, Hisar (India). Tuli, R.K.; Central Institute for Research on Buffaloes, Hisar (India).. Efficacy of Norgestomet ear implant for estrus induction on postpartum anestrus Murrah buffaloes (*bubalus bubalis*). Indian Journal of Animal Sciences (India).

(Jul 2011) v. 81(7) p. 687-690 KEYWORDS: INDUCED OVULATION. WATER BUFFALOES. PUERPERAL DISORDERS.

The study was conducted on 15 lactating, suckled, anestrus Murrah buffaloes to evaluate the efficacy of norgestomet ear implant for induction of estrus, restoration of ovarian cyclicity and fertility at induced and subsequent estrus during early (90 days) and late (120 days) postpartum periods. The suppressive effect of progestagen treatment on largest follicles was visible from day 3 onwards, which regressed  $0.68 \pm 0.05$  mm/d. Consequently, the largest follicle diameter was minimum on day 9 of treatment. After eCG injection (day 9), dominant follicle (DF) grew rapidly to attain significantly larger size than the second largest follicle when DF approached ovulation (day 12). The maximum size of ovulatory follicle was  $12.05 \pm 0.36$  mm. Overall, 14 of the 15 treated buffaloes ovulated and in 13 animals a corpus luteum was observed 10 days later. The conception rates at induced estrus and overall up to third insemination were 66.7% (10/15) and 86.7% (13/15), respectively. In 13 animals, which got pregnant, mean number of inseminations per conception were 1.31. Our results showed that Crestar + eCG was an effective therapy for inducing estrus in postpartum anestrus Murrah buffaloes.

**391.** Muthukumar, M.; National Research Centre on Meat, Hyderabad (India). Sudhakar Reddy, K; Sri Venkateswara Veterinary University, Hyderabad (India). Kondal Reddy, K; Sri Venkateswara Veterinary University, Hyderabad (India). Gopala Reddy, A; Sri Venkateswara Veterinary University, Hyderabad (India). Jagdishwar Reddy, D; Sri Venkateswara Veterinary University, Hyderabad (India). Kondaiah, N; National Research Centre on Meat, Hyderabad (India). Narendra Reddy, C.; Sri Venkateswara Veterinary University, Hyderabad (India).. Pesticides and heavy metals residues in pig tissues in Hyderabad. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 691-695 KEYWORDS: PORK. ORGANOCHLORINE COMPOUNDS. DDT. HCH. RESIDUES.

A study was conducted to estimate certain organochlorine (OC) pesticides (DDT, HCH and cyclodiene compounds) and heavy metals (lead and cadmium) residues in muscle and organs of pigs collected from Hyderabad city. The residues of organochlorine pesticides and heavy metals were found in majority of the analysed muscle and organs samples of pigs. The contamination pattern of OC pesticides in tissues of pigs were in the descending order of p,p'DDT- para para dichloro diphenyl trichlore ethane (0.213 ppm), p,p'DDE- para para dichlorodiphenyl dichlore ethane (0.132 ppm), p,p'DDD- para para dichloro diphenyl dichloroethylene (0.058 ppm), á endosulfan (0.037 ppm), â HCH - hexachloro cyclo hexane (0.028 ppm), ä HCH (0.022 ppm), endosulfan sulfate (0.018 ppm), á HCH (0.017 ppm), â

endosulfan (0.016 ppm), aldrin (0.016 ppm) and  $\alpha$  HCH (0.014 ppm). However, the levels of contamination were quite low and well below the maximum residue level. Among tissues, muscle showed the highest concentration for p,p'DDD; p,p'DDT;  $\alpha$  HCH; aldrin;  $\alpha$  endosulfan;  $\alpha$  endosulfan and endosulfan sulfate, whereas liver showed the highest mean concentration for  $\alpha$  HCH and  $\beta$  HCH. The concentrations of p,p'DDE and  $\beta$  HCH were highest in kidneys. The heavy metals residues were found in all the analysed meat and organs samples. In most of the cases, the levels of contamination were low and below the maximum residue level except in case of lead, where 40.9% samples exceeded the maximum permitted limit. Among tissues, kidney showed highest concentrations for both lead and cadmium.

**392.** Pawaiya, R.V.S.; Indian Veterinary Research Institute, Izatnagar (India). Lal, Krishna; Indian Veterinary Research Institute, Izatnagar (India). Ram Kumar; Indian Veterinary Research Institute, Izatnagar (India).. Genes responsible for cancer: a review. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 783-802 KEYWORDS: NEOPLASMS. ONCOGENICITY. GENES.

Cancer is a complex disease where dynamic changes in multiple genes essential for diverse molecular pathways are involved in its initiation, progression, invasion and metastasis. Cancer causing genes include those involved in cell cycle control, apoptosis, DNA repair, ageing and immortalization, angiogenesis, invasion and metastasis. Activation of oncogenes, inactivation of tumour suppressor genes and alterations in microRNA and other genes through sequential accumulation of mutations, combined with multiple cycles of clonal selection and evolution, facilitate the process of carcinogenesis. Disruption of about 6 to 12 cellular processes is required for neoplastic transformation of a cell. Many oncogenes and oncoproteins are being used as tumour markers' and 'targets' for cancer diagnosis, prognosis and therapy as also for the development of new anti cancer drugs. The oncology research spurred by recent advances in genomics and proteomics has resulted in the generation of individualized molecular portraits of various cancers, thus facilitating to provide individualistic treatment options. Considerable progress has been made in producing small molecules capable of inhibiting the enzymatic activity of Abl, Kit, EGFR, ErbB2 etc. For cases where oncogene products are not enzymes, it has been much more difficult to develop new agents. The discovery of the involvement of microRNAs in the tumorigenesis processes may provide additional targets for anticancer treatments and novel biomarkers. A few altered genes have also been detected in the animal tumours, and veterinary oncology research is being exploited potentially by the western world for the betterment of

both animal and human cancer patients. There is a need to realize the importance of veterinary oncological research in the Indian subcontinent. This review discusses updated understanding about the origin of cancer and its progression which is alike in human and animal biology, and also aims to generate further interest particularly among animal cancer researchers in the Indian subcontinent.

**393.** Bansal, A.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Singh, A.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Cheema, R.S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Brar, P.S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Gandotra, V.K.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Singh, P.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India). Prabhakar, S.; Guru Angad Dev University of Veterinary and Animal Sciences, Ludhiana (India).. Status of oxidative stress and antioxidant enzymes in normally calved and dystocia affected buffaloes. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 915-918 KEYWORDS: WATER BUFFALOES. DYSTOCIA. OXIDATION. STRESS. ANTIOXIDANTS.

The present study was undertaken to assess the activity of antioxidant enzymes, viz. superoxide dismutase, glutathione peroxidase, glutathione reductase and glutathione-S-transferase; and extent of oxidative stress/lipid peroxidation (LPO) in the blood plasma and uterine fluid of normally calved and dystocia affected Murrah buffaloes (fetal dystocia, dystocia due to uterine torsion). The results showed that both in the blood plasma and uterine fluid of dystocia affected animals (fetal dystocia and uterine torsion), malondialdehyde (MDA) production was significantly higher than in normally calved buffaloes. Significant changes were observed in the enzymatic antioxidant status (GPx, GR and SOD) of normally calved buffaloes and those suffering from dystocia in the 2 types of fluid, which could be used as a marker to assess the level of oxidative stress in the latter ones during immediate calving. An alternative diagnostic substrate which appeared to be effective in estimating the quantum of oxidative stress was uterine fluid. In conclusion, severe damage in the cases of fetal dystocia and uterine torsion indicated progression towards deteriorative action of various reactive oxygen species and possibly severe oxidative stress which have been generated during the time of parturition.

**394.** Tikare, Vinay; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Jayakumar, K.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore

(India). Shridhar, N.B.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangaluru (India). Rao, Suguna; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangaluru (India).. Sub chronic toxicity study of *Fusarium verticilloides* culture filtrate from groundnut hay in rats. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 924-927 KEYWORDS: RATS. GROUNDNUTS. HAY. FUSARIUM. PHYTOTOXICITY.

Sub chronic toxicity study of culture filtrate of *Fusarium verticilloides* isolated from the fungal contaminated groundnut hay was conducted in rats. The fungi was isolated from the contaminated groundnut hay which caused mycotoxicosis in cross-bred cattle, exhibited the clinical signs of colic, tenesmus, ruminal atony, anorexia, bleeding from nostrils, rectum and fly bite site. Rats (20) were gavaged with culture filtrate at the dose level of 0.5, 1 and 2 ml daily for 90 days. Clinical signs observed were diarrhoea, weakness, severe arching of back, swollen forehead and conjunctival hemorrhage. Cutaneous hemorrhagic patches on back, scrotum, abdomen, ears and legs region were seen. There was a significant increase (P 0.05) in serum concentrations of creatinine, urea nitrogen, ALT and AST indicated the renal and hepatic damage which was confirmed by histopathology. There were lesions in brain and GI tract of the treated rats. The present study indicated the toxic feature of the culture filtrate of *Fusarium verticilloides* isolated from ground nut hay.

**395.** Bibu, K.J.; Kerala Agricultural University Poultry and Duck Farm, Mannuthy (India).. Aflatoxicosis in a white pekin duck. Veterinary World (India). (May 2011) v.4(5) p. 215 KEYWORDS: DUCKS. POISONING. AFLATOXINS. KERALA.

This article reports a case aflatoxicosis in a 15 month old white pekin duck.

**396.** Mishra, Dibakar; Polasara Science College, Polasara (India).. Ethnoveterinary Practices and use of herbal medicines for treatment of skin diseases in cattle : A study in Polasara Block, Ganjam District, Orissa, India. Veterinary World (India). (Jun 2011) v.4(6) p. 250-253 KEYWORDS: CATTLE. SKIN DISEASES. PHYTOTHERAPY. BEHAVIOUR. VETERINARY MEDICINE. ORISSA.

This study records indigenous medicinal plant utilization in treating skin diseases of cattle population. The study was carried out in Polasara Block, Ganjam District between January 2004 and December 2005. Ethnoveterinary data were collected using pre-structured questionnaires, interviews and field observations with elderly persons, cattle owners, traditional healers and house wives. A total of 12 ethnoveterinary preparations were studied in which 24 plant species belonging to 20 families were documented in the area.

The most frequently used plant parts were leaves (33.33%), followed by oils (29.17%) and rhizomes (25.0%). Most of the medicinal species were collected from the nearby areas of the locality. The principal threatening factors reported were deforestation and agricultural expansion. Documenting the medicinal plants and associated indigenous knowledge can be used as a basis for developing management plans for conservation and sustainable use of medicinal plants in the area and for validation of these plant preparations for veterinary treatment. The low cost and almost no side effects of these preparations make them adaptable by the local community.

**397.** Karamala, Sujatha K.; College of Veterinary Science, Tirupati (India). Sri latha ch.; College of Veterinary Science, Tirupati (India). Anjaneyulu, Y.; College of Veterinary Science, Tirupati (India). Chandra Sekhara Rao, T.S.; College of Veterinary Science, Tirupati (India). Sreeni, Vasulu D; College of Veterinary Science, Tirupati (India). Pidugu, Amravathi P.; College of Veterinary Science, Tirupati (India).. Hematobiochemical changes of lead Poisoning and amelioration with *Ocimum sanctum* in wistar albino rats. *Veterinary World (India)*. (Jun 2011) v.4(6) p. 260-263 KEYWORDS: LABORATORY ANIMALS. RATS. LEAD. POISONING. BLOOD COMPOSITION. OCIMUM BASILICUM. OCIMUM. KERALA.

An experiment was carried out to study the hematobiochemical changes of chronic lead poisoning in adult male wistar albino rats for a period of twelve weeks. Adult 216 healthy rats were randomly divided into six groups viz. control (group I), higher dose of lead acetate 0mg/kg bwt (group II), Lower dose of lead acetate 30 mg/kg bwt (group III), Higher dose of lead + *Ocimum* 400 mg/kg bwt (group IV), lower dose of lead + *Ocimum* 400 mg/kg bwt (group V), *Ocimum* control (group VI). All lead treated and ameliorated groups given Lead acetate/ lead + *Ocimum* orally for three days in a week for a period of twelve weeks. The mean PCV, Hb, values were reduced significantly (P<0.05) in lead treated rats as dose dependent manner. Where as significant improvement was noticed in *Ocimum* treated groups Increased TLC and PLC values as dose dependent manner. A significant reduction in PNC was noticed in *ocimum* treated groups. Significant (P<0.05) decrease in serum total protein values, serum glucose and increased creatinine values were observed in lead treated groups as dose dependent . Increased protein & glucose and decreased creatinine values obtained in *Ocimum* treated groups. The alterations in hematological and biochemical parameters in the present study indicates decreased lifespan & fragility of RBC and damage to liver, kidney and Pancreas in lead poisoned wistar albino rats.

**398.** Samantara, Subharaj; Veterinary Dispensary, Kotpad (India)..

Surgical Management of Lick granuloma in a Boxer Dog. Veterinary World (India). (Jun 2011) v.4(6) p. 271-272 KEYWORDS: DOGS. DERMATITIS. SURGICAL OPERATIONS.

Proper diagnosis of lick granuloma is very difficult. Because the initiating factor is usually not identified and because there is such a strong habit that forms, treatment can also be very frustrating. If we approach the case in a logical way then we can be able to treat the case successfully. In this case surgical excision of the mass along with proper managemental and feeding practices made the treatment a great success.

**399.** Patel, V. R.; Amul Research and Development Agency, Anand (India). Kansara, J. D.; Amul Research and Development Agency, Anand (India). Patel, B.B.; Amul Research and Development Agency, Anand (India). Patel, P.B.; Amul Research and Development Agency, Anand (India). Patel, S.B.; Amul Research and Development Agency, Anand (India).. Prevention of Milk fever: Nutritional Approach. Veterinary World (India). (Jun 2011) v.4(6) p. 278-280 KEYWORDS: DAIRY CATTLE. PARTURIENT PARESIS. DISEASE CONTROL.

The use of negatively balanced cation-anion rations during the late dry or prepartum period requires excellent monitoring and management. The cows must be separated from the remaining herd and fed a total mixed ration as a group. Lower plasma calcium (Ca) will stimulate the Parathyroid hormone (PTH) and 1-hydroxylase system to increase intestinal absorption of Ca and bone resorption – reduce incidence of milk fever. The incidence of milk fever was increased simply by increasing the potassium (K) concentration in pasture Diet high in K or sodium (Na) -alkalinize the blood - decreased bone Ca resorption and renal production of 1, 25-(OH)<sub>2</sub> vitamin D, increase incidence of milk fever. Inadequate supply of magnesium (Mg) in dry period - reduce the ability of a cow to mobilize Ca at parturition. Anionic salts (-ve DCAD) prevents milk fever by acidifying the blood to restore tissue responsiveness to the PTH.

**400.** Parmar, J.J.; Sardarkrushinagar Dantiwada Agricultural Unviersity, Sardarkrushinagar (India). Kag, B.G.; Sardarkrushinagar Dantiwada Agricultural Unviersity, Sardarkrushinagar (India). Patel, P.B.; Sardarkrushinagar Dantiwada Agricultural Unviersity, Sardarkrushinagar (India). Chauhan, H.C.; Sardarkrushinagar Dantiwada Agricultural Unviersity, Sardarkrushinagar (India). Sharma, V.K.; Sardarkrushinagar Dantiwada Agricultural Unviersity, Sardarkrushinagar (India).. Botryomycosis in a Buffalo. Veterinary World (India). (Jul 2011) v.4(7) p. 324-325 KEYWORDS: LESIONS. WATER BUFFALOES.

A rare case of botryomycosis with its typical lesions abundantly on

face, neck and ears is documented in the buffalo. The treatment consisting of surgical intervention followed by local and parenteral administration of most sensitive antibiotic has also been discussed.

**401.** Ganga Naik, S.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College. Ananda, K. J.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College. Kavitha Rani, B.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College. Kotresh, A.M.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College. Shambulingappa, B.E.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College. Patel, S.R.; Karnataka Veterinary, Animal and Fisheries Sciences University, Shimoga (India). Veterinary College.. Navel ill in new born calves and its successful treatment. Veterinary World (India). (Jul 2011) v.4(7) p. 326-327 KEYWORDS: CALVES. NEWBORN ANIMALS.

Navel ill is a condition in which the Navel portion Omphalitis is an inflammation of the umbilicus of the calf is infected, by bacteria's contamination of and it occurs 2-5 days after the birth. In omphalitis, umbilicus following parturition. The infection spreads umbilicus is enlarged, painful on palpation and may be via the umbilical cord. The umbilical cord is a closed or draining purulent material through a fistula. Connection between the fetus and mother, which Omphalophlebitis is a condition in which there is provides necessary nutrient for the development of the inflammation of the umbilical vein. It may occur in fetus during intrauterine life.

**402.** Sharma, V. K.; S. D. Agricultural University, Deesa (India). College of Veterinary Science and Animal Husbandry. Suthar, D. N.; S. D. Agricultural University, Deesa (India). College of Veterinary Science and Animal Husbandry. Dabas, V. S.; S. D. Agricultural University, Deesa (India). College of Veterinary Science and Animal Husbandry. Bhoi, D. B.; S. D. Agricultural University, Deesa (India). College of Veterinary Science and Animal Husbandry.. Per-vaginal handling of Schistosomus reflexus as a cause of dystocia in a Goat. Veterinary World (India). (Jul 2011) v.4(7) p. 330-331 KEYWORDS: GOATS. DYSTOCIA. GENETIC DISORDERS.

Schistosomus reflexus is a rare fatal congenital disorder primarily observed in ruminants. However, dystocia due to this monster is comparatively rare in goat than in cattle and buffalo. Fetotomy or caesarean section is mandatory for delivery of a fully grown schistosomus reflexus monster while, per-vaginal expulsion without any obstetrical assistance is noticed in small sized monster fetuses (Kalita et al., 2004). A successful per-vaginal management of dystocia due to schistosomus reflexus monster in a doe is placed on record.

**403.** Pawaiya, R.V.S.; Indian Veterinary Research Institute, Izatnagar (India). Kumar, Pawan; Indian Veterinary Research Institute, Izatnagar (India).. Occurrence of neoplastic diseases in small ruminants in india: An overview. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 151-165 KEYWORDS: NEOPLASMS. GOATS. SHEEP. INDIA.

Spontaneously or naturally occurring tumours in domestic animals are frequently observed but reports from the small ruminants are very few, mainly on account of slaughtering of these animals at early age for food purpose. Diagnosis and further classification of tumours mostly based on histopathological findings and accuracy in diagnosis and prognosis have been increased by the use of techniques i.e. radiology, biochemical and serological tests, molecular markers etc. The purpose of this paper is to review the occurrence of different types of tumours reported from sheep and goat in India with their morphological and histological features.

#### **M11 Fisheries production**

**404.** Singh, R.; Central Institute of Fisheries Education, Mumbai (India). Pandey, P.K.; Central Institute of Fisheries Education, Mumbai (India). Ram, N; Central Institute of Fisheries Education, Mumbai (India). Chaturvedi, C.S.; Central Institute of Fisheries Education, Mumbai (India). Geospatial Mapping of Fisheries Profile of Andaman and Nicobar Islands of India Through GIS. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 1-7 KEYWORDS: FISHERIES. FISHERY DATA. GEOGRAPHICAL INFORMATION SYSTEMS. ANDAMAN AND NICOBAR ISLANDS.

Geospatial mapping is a location-based study and a part of GIS which is expected to be useful tool for fisheries scientists, aquatic resource managers and policy planners in developing and planning strategies for fisheries resources of the country. In this context, a study was performed where mapping of fisheries profile of Andaman and Nicobar Islands was performed by GIS tool having critical geographic dimensions. For this purpose, at the core of the system, fisheries data of Andaman and Nicobar were accessed and integrated from different sources at district and taluka level. Data were brought in tabular form through Microsoft Excel and then joined to digitized Map of Andaman and Nicobar to enable mapping using Arc info 9.3 GIS software. This was further synchronized and integrated to generate four thematic maps based on different criteria. Map 1 contains searchable criteria as regards to fishermen population as well as their classified categories according to their occupation. Map 2 contains fish production district-/taluka-wise and growth rate for 2000–2007 and district-wise area of ponds/tanks and reservoir along

with fish production. With this mapped information, planners and various stakeholders will have readily accessible district/tehsil level data on various components of fisheries of Andaman and Nicobar Islands, thereby facilitating better planning, management and development of fisheries sector.

### **M12 Aquaculture production and management**

**405.** Rath, S.C.; Central Institute of Freshwater Aquaculture, Bhubaneswar (India). Sarkar, S.; Central Institute of Freshwater Aquaculture, Bhubaneswar (India). Mohanty, S.N.; Central Institute of Freshwater Aquaculture, Bhubaneswar (India). Mohanta, K.N.; Central Institute of Freshwater Aquaculture, Bhubaneswar (India).. Growth, Nutrient Utilization and Whole Body Composition of Genetically Improved Labeo rohita Fry Reared on Diets Varying in Source of Protein. Animal Nutrition and Feed Technology (India). (Sep 2012) v. 12(3) p. 403-410 KEYWORDS: CARP. LABEO ROHITA. PROTEIN CONTENT. GROWTH RATE. GROWTH. NUTRITION PHYSIOLOGY. DIET.

An experiment was conducted to investigate the growth, nutritional indices and whole body chemical composition of genetically improved (selective bred) rohu (*Labeo rohita*) fry using three isonitrogenous (30% CP) diets. Experimental diets viz. F1 (exclusively plant based ingredients with mineral vitamin supplement), F2 (plant based ingredient along with fish meal, but without mineral/vitamin supplement) and F3 (F1 with probiotic) were fed to *L. rohita* fry in FRP tank in triplicates for 30 days. Although the survival rate of fry was found maximum in F3 (95%), the differences was not statistically significant ( $P > 0.05$ ) among the three groups. Weight gain (279.58 $\pm$ 2.53%), SGR (4.45 $\pm$ 0.02 g day<sup>-1</sup>), PER (1.72 $\pm$ 0.02) and NPU (35.66 $\pm$ 0.46%) were significantly higher ( $P < 0.05$ ) in F3 followed by F1 and F2 diets. The FCR was found lowest ( $P < 0.05$ ) in F3 (1.92 $\pm$ 0.02) followed by F1 (2.64 $\pm$ 0.03) and F2 (2.82 $\pm$ 0.02). The whole body crude protein content of F3 (74.9 $\pm$ 0.02%) was significantly higher ( $P < 0.05$ ) than F2 (72.8 $\pm$ 0.38%) and F1 (68.2 $\pm$ 0.33%). The crude lipid content was more in F2 (12.1 $\pm$ 0.06%) followed by F1 (11.4 $\pm$ 0.24%) and F3 (10.4 $\pm$ 0.34%). The experiment results showed that the genetically improved rohu had better growth performance and nutrient utilization in plant based diet supplemented with probiotic and vitamin and mineral premix.

**406.** Sarkar, Paria D; University of Kalyani, Kalyani (India). Bag, S.; University of Kalyani, Kalyani (India). Pradhan, C.; University of Kalyani, Kalyani (India). Ganguly, S. Lahiri; University of Kalyani, Kalyani (India). Jana. S; West Bengal University of Animal and Fishery

Sciences, Kolkata (India). Jana B B; University of Kalyani, Kalyani (India). Indian carp polyculture integrated with ducks and poultry: Ecological and economic benefits. Indian Journal of Animal Sciences (India). (Jul 2011) v. 81(7) p. 773-780 KEYWORDS: FISH CULTURE. DUCKS. POULTRY. ECOLOGY. ENVIRONMENTAL FACTORS.

The production and economic efficiencies of Indian carp polyculture (catla, rohu, mrigal and bata) integrated with duck farming was compared with the integration of poultry following the recommended method of stocking and management over a period of one year. About 13% enhanced fish production in the duck ponds (DP) than in poultry ponds (PP) was attributed to improved ecological conditions such as adequate dissolved oxygen (5.23 - 9.3 mg l<sup>-1</sup>), relatively less amount of ammonia and total inorganic nitrogen, increased level of phosphate, higher values of primary productivity of phytoplankton (47.63–169.81 mg c m<sup>-3</sup> h<sup>-1</sup>) coupled with greater abundance of zooplankton (837–5322 no./50l). In general, the fish yield was inversely related with the N/P input in these ponds suggesting that increased level of nitrogen relative to phosphate was responsible for reduced fish growth in the PP, which, on the other side, was considered as P- limited. Cost benefit analysis of the data revealed that the net profit was about 60% higher in case of DP than in PP. It may be concluded that fish farming integrated with ducks or poultry would be highly effective for achieving cost effective fish production as well as for maintaining the ecosystem health.

**407.** Paul, B.N.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division. Datta, A.K.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division. Das, S.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division. Chattopadhyay, D.N.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division. Giri, S.S.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division. Mohanty, S.N.; Central Institute of Freshwater Aquaculture, Kolkata (India). Wastewater Aquaculture Division.. Effect of dietary lipid levels on growth and carcass composition of Ompok pabda (siluridae) fry. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 198-202 KEYWORDS: SILURIDAE. OMPOK PABDA. NUTRIENTS. LIPIDS. CARCASS COMPOSITION.

An 80-day experiment was conducted to study the lipid requirement of Ompok pabda fry (mean body weight 0.96±0.03g). The diets contained fish meal, soybean meal, corn powder, sunflower oil, fish oil and vitamin mineral mixture. The lipid level in diets was 4.5 (D-1), 6.5 (D- 2), 8.6 (D-3) and 10.6 (D4)%. The growth study with different lipid levels revealed that the net weight gain and

specific growth rate (SGR) of fry were significantly higher (P0.05) on diet D-2, and variation between diets D-2 and D-3 was not significant. Feed conversion ratio (FCR) was lower (P0.05) on diets D-2, D-3 and D-4 than on diet D-1. Protein efficiency ratio (PER) and survival (%) did not differ significantly among diets. Carcass protein content of fry was higher (P0.05) on diet D-2 and it did not differ significantly with those on diet D-3. However, carcass composition of *O. pabda* did not differ significantly among diets. Thus, it may be concluded that lipid requirement of *O. pabda* was 6.5% with protein: energy ratio of 27.22 g MJ<sup>-1</sup>.

**408.** Basade, Yasmeen; Directorate of Coldwater Fisheries Research, Bhimtal (India). Kohli, M.P.S.; Central Institute of Fisheries Education, Mumbai (India).. Effect of dietary betaine on growth performance and nutrient utilization in deccan mahseer tor khudree (Sykes). Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 212-217 KEYWORDS: TOR KHUDREE. BETAINE. GROWTH RATE. NUTRITION PHYSIOLOGY.

Effect of dietary betaine levels on growth performance and nutrient utilization in deccan mahseer juveniles was evaluated. Four isonitrogenous and isocaloric diets were formulated by supplementing the basal diet (37% crude protein) with graded levels of betaine (0, 5, 10 and 15 g kg<sup>-1</sup> diet) and each of the diets were fed to five replicate groups of fish for 180 days. Betaine incorporated diets demonstrated significantly better growth performance and nutrient utilization than the control diet. The feed conversion efficiency (FCE), protein efficiency ratio (PER) and the crude protein (CPE), crude fat (CFE) and gross energy (GEE) efficiencies were significantly (P0.05) higher in betaine fed group as compared to control. Among all the inclusion levels tested, fish fed with diet containing lower dose of betaine (5g kg<sup>-1</sup> of diet) showed significantly (P0.05) higher growth (in terms of weight gain and specific growth rate); high whole body protein, lipid and gross energy contents; high muscle RNA content and RNA/DNA ratio; high apparent dry matter, protein and lipid digestibility; and high activities protease and amylase in intestine and liver. Viscero-somatic index (VSI), hepato-somatic index (HSI), reno-somatic index (RSI) values were also high and cranio-somatic index (CSI) value was less in fish fed with low dietary betaine level. It can be concluded that supplementation of betaine up to the level of 5g kg<sup>-1</sup> diet enhanced growth performance of deccan mahseer juveniles.

### **Q03 Food contamination and toxicology**

**409.** Kumar, Arvind; Sher-e-Kashmir University of Agricultural Science

and Technology, Jammu (India). Division of Livestock Products Technology. Khajuria, P.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Division of Livestock Products Technology. Kaur, M.; Sher-e-Kashmir University of Agricultural Science and Technology, Jammu (India). Division of Livestock Products Technology.. Tracking of Pathogenic and Spoilage Microbes in Mutton and Chevon Processing in Retail Markets of Jammu. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 74-78 KEYWORDS: MUTTON. BIOLOGICAL CONTAMINATION. JAMMU AND KASHMIR.

The aim of this study was to evaluate standard plate count (SPC), psychrotrophic count (PTC), Enterococcus faecalis count (EFC), Staphylococcus aureus count (SAC) and Escherichia coli count (ECC) and the presence of Salmonella spp. and Listeria monocytogenes in retail markets of Jammu. Mutton samples had higher (p0.01) SPC, PTC, EFC, and SAC than chevon. E. coli was recovered from 70.2% mutton and 32.4% chevon samples. The prevalence rate of Salmonella spp. Was 5.42% in mutton compared to 3.12% in chevon. L. monocytogenes recovered were from mutton sample (0.36%). The study revealed that mutton and chevon contain higher microbes and numbers of food pathogens of potential zoonotic importance thus necessitate strict measures for the proper maintenance of meat processing plants.

**410.** Muthukumar, M.; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Reddy, K. Sudhakar; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Reddy, K. Kondal; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Reddy, A. Gopala; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Reddy, D. Jagdishwar; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Reddy, C. Narendra; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology. Kondaiah, N.; College of Veterinary Science, Hyderabad (India). Department of Livestock Products Technology.. Organochlorine pesticide residues of goat tissues. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 199-202 KEYWORDS: GOATS. TISSUE ANALYSIS. ORGANOCHLORINE COMPOUNDS. PESTICIDES. RESIDUES.

Organochlorine (OC) pesticides viz., DDT (Dichloro Diphenyl Trichloroethane), HCH (Hexachloro Cyclo Hexane) and cyclodiene compounds (Aldrin and Endosulfan) residues in muscle and organs of goats collected from Hyderabad (Andhra Pradesh) were estimated by gas chromatograph. Majority of the analysed muscle and organs

samples of goats contained residues of metabolites of DDT (p,p'DDT - para para Dichloro Diphenyl Trichlore ethane and p,p'DDE - para para Dichlorodiphenyl Dichlore Ethane), isomers of HCH ( $\gamma$  and  $\delta$  HCH) and cyclodiene compounds. However, the levels of contamination in all the analyzed tissue were below the maximum residue limit (MRL). Further, none of the samples of goat showed presence of p,p'DDD (para para Dichloro Diphenyl Dichloroethylene), a HCH, (3 HCH and endosulfan sulphate. The contamination pattern of OC pesticides in tissues of goat were in the descending order of p,p'DDT (0.157 ppm), p,p'DDE (0.047 ppm), aldrin (0.020 ppm),  $\alpha$  and (3 endosulfan (0.020 ppm),  $\delta$  HCH (0.014 ppm) and  $\gamma$  HCH (0.012 ppm). Among tissues, muscle showed the highest concentration for all residues except p,p'DDE, which was more in liver samples.

#### **Q54 Feed composition**

**411.** Chatterjee, A.; National Research Centre on Yak, Dirang (India). De, D.; National Research Centre on Yak, Dirang (India). Sheikh, I.U.; National Research Centre on Yak, Dirang (India).. Macro and micro elemental concentrations in some locally available tree fodder of Sikkim. Indian Journal of Animal Sciences (India). (Sep 2011) v. 81(9) p. 984-987 KEYWORDS: FORAGE. TRACE ELEMENTS. SIKKIM.

The concentration of some important macro and micro elements were studied in 21 locally available tree fodder collected from different parts of Sikkim. The calcium and phosphorus concentration (% DM) ranged from 0.16 to 0.31 and 0.08 to 0.48, respectively. The magnesium concentration (% DM) was much lower ranging narrowly from 0.04 to 0.07. All the tree leaves were found to be richer in potassium in comparison to other macro elements analysed here the values ranging from 0.38 to 2.9% of DM. Sodium concentration (% DM) ranged from 0.02 to 0.06. The mean concentration (% DM) of different macro and micro elements in tree fodder analysed in the present investigation were  $0.284 \pm 0.007$ ,  $0.195 \pm 0.027$ ,  $0.058 \pm 0.002$ ,  $0.029 \pm 0.002$  and  $1.55 \pm 0.16$ ,  $54.85 \pm 10.64$ ,  $39.16 \pm 3.47$ ,  $227.9 \pm 47.0$ ,  $0.39 \pm 0.08$ , and  $395.49 \pm 46.75$ , respectively, for calcium, phosphorus, magnesium, sodium, potassium, copper, zinc, manganese, cobalt and iron. Out of 21, only 6 tree fodder namely, chiple, barhar, gayo, katusha, khasre and rai khanyum, have all the trace elements in the concentrations well above the critical levels. Forty two per cent of the total tree fodder samples analysed here were deficient in Zn and 28.5 per cent were deficient in Co. Only 9.5 and 4.7% samples were deficient in Mn and Fe, respectively. None of the samples were deficient in Cu.

**412.** Prasaad, K.S.N.; National Dairy Research Institute Bangalore (India). Southern Campus.Reddy, A.O.; National Dairy Research

Institute Bangalore (India). Southern Campus.. Trace mineral status in feeds and fodders of sewage and non-sewage areas. Indian Journal of Animal Nutrition (India). (Jun 2011) v. 28(2) p. 157-159  
KEYWORDS: FEED CROPS. FORAGE. TRACE ELEMENTS. WASTEWATER.

The study was under taken to analyse trace mineral status in feeds and fodders of sewage and non sewage areas and also compare this status with requirements of dairy animals. The results showed that Cu, Mn, Fe & Zn in fodders of sewage area were in the range of 39.97–54.93, 29.95–94.16, 231.48–341.40 and 55.35–97.50ppm, where as in non sewage areas ranged from 31.36–45.38, 104.52 - 202.28, 262.09–537.77 and 58.56- 59.42 ppm. In concentrates the ranges were 37.51–74.13, 47.5–97.73, 137.57–574.0 and 32.8–78.20 ppm of Cu, Mn, Fe and Zn in sewage areas and these were in the range of 35.7046.83, 42.89–80.83, 190.2–285.82 and 49.22–73.73ppm in non sewage areas in most of the samples, where as Zn was deficient in most of the areas irrespective of sewage water.

#### **U10 Mathematical and statistical methods**

**413.** Hadge, M.R.; Post Graduate Institute of Veterinary and Animal Sciences, Akola (India). Department of Animal Genetics and Breeding. Kuralkar, S.V.; Post Graduate Institute of Veterinary and Animal Sciences, Akola (India). Department of Animal Genetics and Breeding. Ali, S.Z.; Post Graduate Institute of Veterinary and Animal Sciences, Akola (India). Department of Animal Genetics and Breeding. Kharkar, K.P.; Post Graduate Institute of Veterinary and Animal Sciences, Akola (India). Department of Animal Genetics and Breeding. Sawaimul, A.D.; Post Graduate Institute of Veterinary and Animal Sciences, Akola (India). Department of Animal Genetics and Breeding.. Genetic Studies on Productive Traits of Sahiwal and Sahiwal x Jersey Crossbred Cows. Indian Journal of Animal Research (India). (Mar 2012) v. 46(1) p. 92-94  
KEYWORDS: COWS. CROSSBREDS. LACTATION DURATION. LACTATION. MILK YIELD. MILK PERFORMANCE. HERITABILITY.

The data on 194 lactations of Sahiwal cows and 81 lactations of Sahiwal x Jersey crossbred cows of Bull Mother Farm, Wadsa Dist. Gadchiroli (M.S.) spread over a period 19 years (1989 to 2007) were analyzed by least square techniques to study the effect of sire, season of calving and period of calving on lactation milk yield, lactation length and dry period. Least square analysis of variance shows that period of calving was highly significant for lactation milk yield in Sahiwal and Sahiwal x Jersey crossbred cows however season of calving had non significant effect on all traits in Sahiwal and Sahiwal x Jersey crossbred cows. Sire had highly significant effect on lactation milk yield and lactation length in the Sahiwal x Jersey

crossbreed cows. The overall least squares means for lactation milk yield, lactation length and dry period of Sahiwal and Sahiwal x Jersey crossbred cows were  $1122.74 \pm 80.74$  kg and  $1391.38 \pm 171.51$  kg;  $279.72 \pm 6.55$  days and  $288.49 \pm 9.19$  days;  $247.14 \pm 33.69$  days and  $249.72 \pm 21.36$  days, respectively. The moderate to high heritability estimates indicate that they can be improved through selective breeding.

**414.** Amit Kumar; National Dairy Research Institute, Karnal (India). Gandhi, R.S.; National Dairy Research Institute, Karnal (India). Aynalem Haile; ILRI, Addis Ababa (Ethiopia). Estimation of variance components of milk yield and genetic evaluation of Sahiwal cattle using mixed linear models. Indian Journal of Animal Sciences (India). (June 2011) v. 81 (6) p. 605-609 KEYWORDS: CATTLE. SIRE EVALUATION. ANIMAL MODELS. LINEAR MODELS.

First lactation 305 days milk yield (FL305DMY) records (2032) on Sahiwal cows, maintained at 3 different farms in India were analyzed to estimate the impact of direct additive genetic, maternal additive genetic and cow's permanent environmental effects on milk yield and to compare sire model (BLUP) with 3 different animal models i.e. simple univariate model (AM I), univariate model with maternal effect and cow's permanent environmental effect (AM II) and multivariate model (AM III) of sire evaluation. The sire model of BLUP was least capable to estimate genetic differences amongst bulls. The heritability estimate for milk yield using sire model was lowest (0.141), followed by animal Models, viz. AM II (0.236), AM III (0.260) and AM I (0.292). Among animal models, lowest estimate of heritability obtained using AM II indicated for presence of significant amount of maternal additive genetic variance (26485.05 kg ) and maternal effect explained 11.1 % of total phenotypic variation in milk yield. The permanent environmental effect of cows explained 2.5 % variation of milk yield. The AM II was most effective model in terms of efficiency and accuracy over other models of sire evaluation. The rank correlations amongst the estimated breeding values of sires for FL305DMY were higher ranging from 0.898 (sire model versus AM III) to 0.991 (AM I versus AM II) indicating similarity in ranking of sires to the degree of 90 percent and above from different methods of Sahiwal sire evaluation.

**415.** Upasna, S.; National Bureau of Animal Genetic Resources, Karnal (India). Joshi, Jyoti; National Bureau of Animal Genetic Resources, Karnal (India). Banerjee, Priyanka; National Bureau of Animal Genetic Resources, Karnal (India). Vijh, R.K.; National Bureau of Animal Genetic Resources, Karnal (India). Genetic landscape and demography of buffaloes in Indo- Gangetic plains. Indian Journal of Animal Sciences (India). (Aug 2011) v. 81(8) p. 836-848 KEYWORDS:

WATER BUFFALOES. DEMOGRAPHY. SPATIAL DISTRIBUTION. STATISTICAL METHODS. UTTAR PRADESH.

The Indo-Gangetic plains have about a quarter of the total buffalo population in the country, yet there have been only one defined breed of buffalo in this vast plains traversed by 2 major rivers of the country and their large number of tributaries. We generated data on 625 buffaloes using 11 microsatellite loci and carried out the statistical analysis to reveal genetic landscape, demographic parameters of these buffaloes and to investigate the existence of genetic structures underlying the continuity of geographical landscape. The investigations revealed that there is isolation by distance and existence of 5 genetic structures, though these structures do not have continuity among the sampled areas. The analysis of data on buffaloes of Indo-Gangetic plains revealed that there has not been any recent colonization event nor severe reduction in the effective population size. There has been a historical constancy of size of buffalo in this geographical area as revealed by  $k$  and  $g$  tests. The analysis revealed aggregation of alleles pointing towards absence of randomness in the geographical landscape. The Moran and Geary's index also reveal non randomness of the distribution of allele pointing towards existence of population structure in the Indo-Gangetic Plains. The analysis of variance revealed 6% variation attributable to districts component. The existence of major rivers and their tributaries do not have significant effect on the structuring of the populations as revealed by partial Mantel tests.

**416.** Yadav, Dinesh Kumar; National Bureau of Animal Genetic Resources, Karnal (India). Arora, Reena; National Bureau of Animal Genetic Resources, Karnal (India). Bhatia, S.; National Bureau of Animal Genetic Resources, Karnal (India). Singh, Gurmej; National Bureau of Animal Genetic Resources, Karnal (India). Bhar, L.M.; Indian Agricultural Statistics Research Institute, New Delhi (India).. Robust regression for determining selection criterion of breeding rams. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 166-169 KEYWORDS: RAMS. SELECTION CRITERIA. STATISTICAL METHODS.

Selection of rams in farmers' flocks is done by simple procedures involving judgment of size, conformation and condition. Robust regression model was fitted to the data on body measurements for determining selection criterion for breeding rams under field conditions. Body weight at different ages is the dependent variable in the model. The model identified the best combination of body measurements ( $X_1$ =body height;  $X_2$ =chest girth;  $X_3$ =paunch girth;  $X_4$ =body length;  $X_5$ =ear length;  $X_6$ =tail length) which explained the gain in body weight. Mean square error (MSE) and  $R^2$  were used to

evaluate the estimator performance. The study indicates that the explanatory variable X2 is important growth trait for selecting breeding rams between 12–18 months of age under field conditions. The findings of this study will be helpful in identifying growth traits for defining selection criterion for selecting breeding rams in improvement and conservation of Munjal sheep.

### **U30 Research methods**

**417.** Raja, A.S.M.; Central Sheep and Wool Research Institute, Avikanagar (India). Ammayappan, L.; Central Sheep and Wool Research Institute, Avikanagar (India). Shakyawar, D.B.; Central Sheep and Wool Research Institute, Avikanagar (India). Gupta, N.P.; Central Sheep and Wool Research Institute, Avikanagar (India).. Production and Performance of Angora Rabbit Hair- Bharat Merino Wool Blended Shawls. Indian Journal of Small Ruminants (India). (Apr 2011) v. 17(1) p. 79-82 KEYWORDS: RABBITS. WOOL. MOHAIR.

Angora rabbit hair was mixed with Bharat Merino wool in three different proportions viz. 28:72, 40:60 and 60:40, at the carding stage using modified cotton card. The blends were then processed to prepare yarn using semi worsted spinning system. During spinning, it was observed that rabbit hair could be blended up to 60% without any difficulties. The developed yarns were used to produce shawl fabric using powerloom, followed by dyeing with reactive dye and finishing with cationic softener. The performance of the shawls showed that softness and thermal insulation of the shawls was increased with the increase in the proportion of Angora rabbit hair from 28 to 60%. The abrasion loss was also less when the rabbit hair proportion was increased in the shawls.

**418.** Raja, A.S.M.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Shakyawar, D.B.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Pareek, P.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Wani, Sarfaraz A.; Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar (India).. Production and performance of pure cashmere shawl fabric using machine spun yarn by nylon dissolution process. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 203-206 KEYWORDS: ANIMAL FIBRES. WOOL. PROCESSED ANIMAL PRODUCTS.

Cashmere fibre is produced from the down hair of domesticated double-coat goat (*Capra hircus*). It is very difficult to spin it in machine due to its soft, short and slippery scales which create lapping due to the development of static charges during carding,

sliver making and spinning processes. In this study, an attempt was made to produce machine spun cashmere yarn using nylon as a carrier fibre for manufacturing shawl type fabric. The nylon portion of the fabric was removed by hydrochloric acid treatment and 18% was found to be satisfactory. Finally, the fabric produced was compared with the conventionally hand spun yarn made cashmere shawl fabric. The results showed non-significant difference between the two fabrics in terms of softness and thermal conductivity. However, the machine spun yarn made fabric showed 60% lower extension and 50% higher abrasion losses. Scanning electron microscopy showed that the machine spun yarn made fabric had minute deposits of dissolved nylon at a few places. The results indicated that the process of preparing cashmere fabric using hand spun yarn could be replaced with machine spun yarn using nylon dissolution process without compromising the softness and thermal insulation properties; however, higher abrasion loss is a limiting factor.

**419.** Shakyawar, D.B.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Raja, A.S.M.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Gupta, N.P.; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry. Ammayappan, L; Central Sheep and Wool Research Institute, Avikanagar (India). Division of Textile Manufacture and Textile Chemistry.. Development of Magra wool - nylon blended hand knotted carpets. Indian Journal of Small Ruminants (India). (Oct 2011) v. 17(2) p. 207-209 KEYWORDS: ANIMAL FIBRES. WOOL.

Rajasthan is one of the important carpet wool producing states. It produces about 10 m kg of wool annually and contributes significantly to the carpet production. Among the different carpet wool producing sheep, Magra is one of the best breeds producing excellent quality carpet wool. In this study, attempt was made to blend Magra wool with different proportions of nylon viz. 95:5, 90:10 and 85:15 in order to improve the abrasion resistance of the carpet. Nylon blended yarns as well as the pure Magra wool yarns were used to produce the carpet. The carpets made from Magra wool-nylon blends showed lower abrasion loss compared to pure Magra wool. The carpets made from 10:90 nylon-wool proportion gave very good appearance compared to 100% wool. However, carpets made from blended yarns containing more than 10% nylon showed poor recovery after dynamic loading.

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