

The Indian Animal Sciences ABSTRACTS



**भारतीय
ICAR**

**Indian Council of Agricultural Research
New Delhi**

The Indian Animal Sciences ABSTRACTS



Published by

Directorate of Knowledge Management in Agriculture
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan I,
Pusa, New Delhi 110012

Published : July 2012

Project Director (DKMA) : Dr D.K. Agarwal

Compilation and Technical Editing : Hans Raj

Information Systems Officer

Kiran Kochhar

Technical Officer

© 2012, Indian Council of Agricultural Research, New Delhi

Published by Dr D.K. Agarwal, Project Director, Directorate of Knowledge Management in Agriculture, Indian Council of Agricultural Research, Krishi Anusandhan Bhawan I, Pusa, New Delhi 110012

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

2
3
4
5
6

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

001. Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India). Phand, Shahaji; Indian Veterinary Research Institute, Izatnagar (India). Sharma, M.C.; Indian Veterinary Research Institute, Izatnagar (India). Status and scope of information and communication technology for livestock and poultry production in India– a review. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1235–42 KEYWORDS: HERDS. DAIRY INDUSTRY. MANAGEMENT. INFORMATION PROCESSING. INFORMATION EXCHANGE. LIVESTOCK. ANIMAL PRODUCTS. ANIMAL HUSBANDRY.

Much has been said about the potential use of Information and Communications Technology (ICT) by government agencies to boost relations with rural masses. Experience shows that the key challenge in building information society is securing institutional support at all levels. Government can stall or unleash new vision for development of ICTs. Though the ICT is diffusing in the rural area but until the costs of the last mile of basic IT devices and of local language software are brought down, the goal of wiring India will remain unachieved. The marketing competition between private players in the field of ICT is making favorable ground for diffusion of ICT in rural India. But, Low-cost technological solutions alone are of course not solutions to the problems of development, but they are prerequisites for diffusion of IT in rural India. The initiatives for e-literacy are laudable and have many implications for dissemination of ICT but the situation where we have yet to achieve 100% basic literacy and hence there is need to develop training programmes in rural areas to teach basic infrastructure maintenance skills required for ICT use. Despite of all constraints the ICT is spreading with its own pace and in future the process will speed up. It seems that in near future there will be sound platform for communication and service delivery in rural area through the ICT based devices and value added services. By that time the various sector associated with rural development; including livestock sector should come up with the need based, location specific and local language contents in the form of computer software and other electronic material.

002. Thamizhselvi, R.K.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Rao, S. V. N.; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Is contract broiler farming exploitative to small farmers? Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1243–50 KEYWORDS: CONTRACT FARMING. FARMERS. SMALL FARMS.

A study of 49 contract broiler farmers under 4 leading integrators in and around Puducherry revealed that the contract is one sided favouring the integrator as the contract stipulates standards for the outputs from the farmer but it does not specify any standards for the inputs the integrator supplies such as weight of the day-old chick, quality standards for feed and medicines. The findings also indicated that the weight of the day-old chicks supplied was less than the standard weight of 40 g, an important cause for low body weight gain as well as high mortality. Although the integrators are bearing the risk of production and marketing, the contract broiler farming is exploitative as the integrators are paying on an average 4.61/bird, mostly on the basis of production cost. The integrators may do well by bearing the cost of the miscellaneous inputs being provided by the farmers and by taking feed conversion ratio as the basis for payment rather than production cost on which the farmer has very little control.

003. Bardhan, D.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Factors influencing farmers willingness to pay for animal health services and preference for private veterinary practitioners. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 790-797 KEYWORDS: VETERINARY SERVICES. LIVESTOCK. PRIVATIZATION.

The study was carried out in Tarai region of Uttarakhand, with the objectives of ascertaining factors influencing farmers; willingness to pay for animal health services (AHS) and preference for private veterinary practitioners. The findings of the study revealed that para-veterinary staff compared poorly with private and government veterinarians in regard to quality of services provided. Indeed quality was perceived by vast

majority of farmers as their most preferred attribute of AHS. Price as an attribute was rated quite low compared to quality and even other attributes like proximity, which implied that if quality AHS is guaranteed, price is not an important determinant in the farmers; uptake decisions. A vast majority of farmers asserted that they were willing to pay (WTP) for quality AHS. Furthermore, the poorer the farmer, the greater was the probability that he will be WTP. Distance to market was observed as a significant determinant of WTP. The findings also revealed that the preference for private veterinarian increased with the wealth status. Risk attitude was also found to influence choice of AHS provider. Risk averse farmers preferred government veterinarians while risk taking farmers showed a tendency to prefer private practitioner. The overall message of the findings was that there are variations in the valuation of AHS attributes – price being only one of them - that cause farmers belonging to different wealth categories to prefer different AHS providers. The study suggests that the animal health delivery system may be reformed to enable greater participation of private sector.

L01 Animal Husbandry

004. Kumar, Ravindra; Ranchi Veterinary College, Ranchi (India). Department of Livestock Production Management. Kumar, Ashok; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary Sciences, Department of Livestock Production & Management. Patel, M.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary Sciences, Department of Livestock Production & Management. Kumar, Anil; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary Sciences, Department of Livestock Production & Management. Yadav, A. K.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary Sciences, Department of Livestock Production & Management. Prediction of body weight based on body measurements of pig. Indian Journal of Veterinary Research (India). (Jul-Dec 2011) v. 20(2) p.15-19 KEYWORDS: BODY MEASUREMENTS. BODY WEIGHT. SWINE.

A total of twenty four Large White Yorkshire weaners nearly of same body weight were selected for the present study. The prediction equations were constructed to estimate the body weight of pigs indirectly from different body measurements of 24 pigs. The body weight was highly correlated (PO.OI) with body length, heart girth and height at withers. Accuracy for the measurement of body weight with prediction equation using one or two independent variables shifting from heart girth to height at withers with increase in body weight. Coefficient of multiple determination (R^2) increases gradually as the number of independent variables increased in the prediction equation and the best prediction equation was observed when all the 3 body measurements were included in the equation. Correlation coefficient of body weight with body measurements 00 were also found to be highly correlated.

005. Ali, Ayub; Animal Husbandry Central Agricultural University, Aizawl (India). College of Veterinary Sciences & Animal Husbandry, Department of Veterinary Biochemistry. Hmar, Lalnunluangi; Animal Husbandry Central Agricultural University, Aizawl (India). College of Veterinary Sciences & Animal Husbandry, Department of Veterinary Biochemistry. Lalliankimi, H.; Animal Husbandry Central Agricultural University, Aizawl (India). College of Veterinary Sciences & Animal Husbandry, Department of Veterinary Biochemistry. Chanu, Kh. Victoria; Animal Husbandry Central Agricultural University, Aizawl (India). College of Veterinary Sciences & Animal Husbandry, Department of Veterinary Biochemistry. Patra, Gautam; Animal Husbandry Central Agricultural University, Aizawl (India). College of Veterinary Sciences & Animal Husbandry, Department of Veterinary Biochemistry. Devi, L. Inaotombi; Regional Institute of Paramedical and Nursing Sciences, Aizawl (India). Department of MLT. Effect of Zinc supplementation on serum biochemical profile of 2 Japanese Quails (*Coturnix coturnix japonica*). Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.24-28 KEYWORDS: CHLORIDES. GLUCOSE. QUAILS.

The serum biochemical profile of Japanese Quails which were supplanted with Zinc in the diet was studied. The concentration of serum glucose, total protein, uric acid, AST, chloride and phosphorus changes when the birds were fed with Zinc supplemented diet while the concentration of cholesterol, ALT, alkaline phosphatase

and magnesium remains unchanged. The levels of serum glucose, AST and phosphorus increases with the increase of Zinc in the diet while the level of uric acid and chloride decreased. Total protein level increased initially on Zinc supplementation but further increase in the amount of Zinc resulted in decrease level of total protein.

006. Sunder, Jai; Central Agricultural Research Institute, Port Blair (India). Division of Animal Science. Singh, D.R.; Central Agricultural Research Institute, Port Blair (India). Division of Animal Science. Kundu, A.; Central Agricultural Research Institute, Port Blair (India). Division of Animal Science. Jeyakumarand, S.; Central Agricultural Research Institute, Port Blair (India). Division of Animal Science. Verma, S.K.; Central Agricultural Research Institute, Port Blair (India). Division of Animal Science. Supplementation of *Morinda citrifolia* extract on growth, production and immune response of Japanese quail. *Indian Journal of Veterinary Research (India)*. (Jul Dec 2011) v. 20(2) p.61-65 KEYWORDS: GROWTH. PRODUCTION. IMMUNE RESPONSE. QUAILS.

The response of Japanese quail to supplementation of *Morinda citrifolia* fruit juice with reference to growth, production and immune response was studied. The Japanese quail were fed *Morinda citrifolia* fruit juice from 0-7 weeks during growing period and from 8-14 weeks during laying periods. The body weight gains, feed conversion ratio, performance index and immunity status were recorded in both control and treated groups. The result revealed better growth performance in the *Morinda* fed groups compared to the control group. Overall performance index of *Morinda* group was also better than control group. The humoral immune response of the *Morinda* group was significantly better than control group. The *Morinda* fed birds produced 30.90 eggs / hen housed during 8-14 weeks of age; while only 20.9 eggs /hen housed produced by control groups. The overall analysis of the growth and production performance of both the groups revealed that supplementation of *M. citrifolia* crude fruit juice 5% daily enhanced the body weight gain and egg production performance in the Japanese quail.

007. Malik, S; ICAR Research Complex for NEH Region, Lembucherra (India). Singh, N P; ICAR Research Complex for NEH Region, Lembucherra (India). Performance of CARI Nirbheek in agroclimatic conditions of Tripura. *Indian Journal of Animal Sciences (India)*. (Dec 2010) v. 80(12) p. 1213–16 KEYWORDS: BODY WEIGHT. EGG PRODUCTION. POULTRY FARMING. RURAL AREAS.

Fertile eggs (1151) of CARI Nirbheek were procured from CARI, Izatnagar and 632 chicks were hatched out. The chicks were brooded on deep litter and at 8 weeks of age, 50% of all the survived chicks were distributed to the farmers of Sambhurampara village of West Tripura district for rearing in backyard system. The growth and production performance of CARI Nirbheek was studied at both the locations, viz. farm and field conditions. The mean body weights at 20 weeks of age were: 1.801 ± 0.019 , 1.414 ± 0.017 and 1.577 ± 0.017 kg, respectively, for males, females and overall mean at the farm and the corresponding body weights under field condition were: 1.642 ± 0.061 , 1.346 ± 0.029 and 1.482 ± 0.04 kg, respectively. The difference in mean body weights at farm and field conditions were nonsignificant except body weight at 20 weeks of age. The cumulative feed consumption up to 6 weeks of age was 0.981 kg at the Institute farm. The feed consumption per day between 19–20 and 39–40 weeks of age were 99.0 and 160.22 ± 0.68 g/bird, respectively. The age at sexual maturity was 187.16 ± 0.35 and 198.04 ± 1.70 days, respectively, at farm and under field conditions. The egg production up to 40 weeks of age was 37.32 and 26.31 eggs, respectively, at farm and field conditions and average egg production up to 72 weeks of age were 161.53 eggs at the farm. The egg quality traits viz. egg width, egg length, shape index, albumin weight, percent thick albumin, total albumin weight, percent albumin ratio, albumin index, yolk weight, percent yolk ratio, yolk index, shell thickness and Haugh unit of CARI Nirbheek were studied at 40 weeks of age at the farm. The value for different egg quality traits and Haugh Unit indicated better quality of the eggs of CARI Nirbheek.

008. Jakhar, Gajender Singh; Chaudhary Charan Singh University, Meerut (India). Singh, Rajbir; Chaudhary Charan Singh University, Meerut (India). Malik, C.P.; Chaudhary Charan Singh University, Meerut (India).

Kumar, Raj; Chaudhary Charan Singh University, Meerut (India). Factors affecting productive herd life, longevity and lifetime calf production traits in Haryana cattle. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1251–53 KEYWORDS: CATTLE. LONGEVITY. LIVESTOCK MANAGEMENT. HERDS.

009. Mishra, A.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Arora, A.L.; Central Sheep and Wool Research Institute, Avikanagar (India). Prince, L.L.L.; Central Sheep and Wool Research Institute, Avikanagar (India). Kumar, S.; Central Sheep and Wool Research Institute, Avikanagar (India). Effect of crossing FecB carrier rams of prolific Garole x Malpura halfbreds with FecB non- carrier Malpura ewes. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1254–56 KEYWORDS: BODY WEIGHT. GENES. EWES.

010. Chandra, Ramesh; ICAR Research Complex for NEH Region, Tadong (India). Karmakar, H.D.; ICAR Research Complex for NEH Region, Tadong (India). De, Debasis; ICAR Research Complex for NEH Region, Tadong (India). Mishra, K.C.; ICAR Research Complex for NEH Region, Tadong (India). Pre weaning mortality in Angora rabbits. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1257–58 KEYWORDS: RABBITS. LITTER SIZE. WEIGHT. MORTALITY.

011. Gadariya, M.R.; Gujarat Agricultural University, Anand (India). Patel, M.; Gujarat Agricultural University, Anand (India). Dhama, A.J.; Gujarat Agricultural University, Anand (India). Approximation of work stress of ploughing and planking on carting load scale in working bullocks. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1267–69 KEYWORDS: BULLOCKS. BLOOD DISORDERS. STRESS. SAWWOOD. PLOUGHING.

012. Biradar, Nagaratna; Indian Grassland and Fodder Research Institute, Dharwad (India). Regional Research Centre Sridhar, K.; Indian Grassland and Fodder Research Institute, Dharwad (India). Regional Research Centre Pushpa, P.; Indian Grassland and Fodder Research Institute, Dharwad (India). Regional Research Centre Hanchinal, S.N.; Indian Grassland and Fodder Research Institute, Dharwad (India). Regional Research Centre. Analysis of feeding systems under urban and peri-urban livestock production of Deccan plateau. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 671-673 KEYWORDS: LIVESTOCK. ANIMAL PRODUCTION. FARMS. FEEDS. FEEDING SYSTEMS. KARNATAKA.

A study of 140 resource-poor urban peri-urban livestock keepers was carried out in 2007 in three tier-II cities, viz. Hubli-Dharwad, Belgaum and Bagalkote of Karnataka. In a randomized block design, their daily livestock feeding pattern was analysed by measuring actual quantities of feed and fodder fed to the livestock for 1 week in 15 households. Distance of the households from the centre of the city was used to separate blocks as core (2 km), fringe (2–4 km) and more rural (4–8 km). Dependence on dry fodder was to the extent of 72% and it varied significantly across 3 groups. There was a significant difference in the quantity of dry fodder purchased by the livestock holders of three groups. Wheat bran and/or rice bran were the most sought after feed type as they were purchased in more quantity. The feeding system followed in non lactating livestock, that differed significantly, adequately met TDN but not DCP requirement. In lactating livestock it was deficit both in TDN and DCP. Highly significant difference was found both for meeting TDN and DCP requirement by the feeding system followed by the livestock holders of three categories. However, livestock husbandry still continues to be the main livelihood source for core (40.75%) and fringe (48.05%) groups. It is important to augment this livelihood source through technical and extension back-up on simple tools like cost effective balanced feeding, enrichment of dry fodder with urea and salt treatment and use of compact feed blocks.

013. Dikshit, A.K.; National Centre for Agricultural Economics and Policy Research, New Delhi (India). Pratap, S. Birthal; National Centre for Agricultural Economics and Policy Research, New Delhi (India).

Environmental value of dung in mixed crop-livestock systems. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 679-682 KEYWORDS: LIVESTOCK. FARMYARD MANURE. ENVIRONMENT.

Dung is an important byproduct of livestock. It is used as manure, or is converted into dung cakes for use as fuel or mixed with clay for flooring and plastering of mud houses. Apart from these important uses of dung, it also has a great environmental value. Its contributions to environment could be positive as well as negative. From the negative side, methane emission from manure management is a negative environmental externality. The positive externality is the use of dung cake as domestic fuel, which can be seen as a substitution or replacement of the equivalent amount of thermal energy from fuel-wood or fossil-fuel. It is a great saving on fuel-wood by cutting down of standing forests and trees, and another is the saving of land that is required to produce replacement amount of fuel-wood for dung cake. In the present paper we have estimated the quantity of fuel-wood that would be required to replace dung-cake as domestic fuel, and the land area that would be required to produce or supply that amount of fuel-wood. At current feeding rates, India produces over 83 million tonnes of dry dung-cake, which is used annually by the rural households as domestic fuel for cooking and warming. If this amount of dung cake was to be replaced by fuel wood, the country will require producing an additional amount of 23.5 million tonnes of fuel-wood, and the additional land requirement for fuel-wood plantation will be about 2.35 million ha. From the perspective of food production, supposing that under traditional rainfed agriculture food grains yield ranges from 1.5 to 2 tonnes/ha, the land saved would produce 3.5 to 5 million tonnes of foodgrains.

014. Jat, R.P.; CCS Haryana Agricultural University, Hisar (India). Yadav, B.L.; CCS Haryana Agricultural University, Hisar (India). Growth and behavioural pattern of buffalo calves under different shelter modifications during winter. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 686-689 KEYWORDS: CALVES. ANIMAL HOUSING. CATTLE SHEDS. SEASONS.

Female Murrah buffalo calves (20), 14 to 16 month-old, were divided into 4 groups of 5 each on the basis of age and body weight and allotted to 4 housing [loose house (T_1), LH + thatch roof (T_2), LH + mud plaster roof (T_3) and closed barn (T_4)] systems to study effect of housing on growth and behavioural pattern. The daily weight gain and feed conversion efficiency were not influenced significantly by roof modifications. The housing system had no significant effect on the mean gain in length, height, heart girth, abdominal girth, hip bone and pin bone width of calves. The buffalo calves kept in loose house spent less eating time than those kept in thatch roof and barn house. The resting and standing time in the night was significantly affected by housing systems. The average resting and standing time in 24 h were not significantly affected by treatments. The average urination and defecation frequency per day was affected by type of houses. The defecation frequency was more in barn housed calves than those kept in modified house. It is inferred that barn house is better as compared to loose house for buffalo calves during winter.

015. Goswami¹, S.N.; National Bureau of Soil Survey and Land Use planning, Nagpur (India). Mandal, D.K.; National Bureau of Soil Survey and Land Use planning, Nagpur (India). Mandal, C.; National Bureau of Soil Survey and Land Use planning, Nagpur (India). Reducing methane emission through management of cattle population and grass land—a case study in different regions of Maharashtra. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 764-767 KEYWORDS: CATTLE. GREENHOUSE GASES. METHANE. MAHARASHTRA.

Agriculture contributes about 20% of global greenhouse gases (GHGs). Among the agricultural processes, ruminant livestock emits the highest amount (59%) of GHG through enteric fermentation which needs reduction through maintaining optimum size of animal population as per carrying capacity of the grazing land (GLS) available in the region, apart from endeavoring development of concentrated feed stock. While estimating the emission potential of the animal population of Maharashtra, mathematical model for computing desired level of animal population at carrying of presently available GLS of regions namely Konkan, western Maharashtra, Marathwada and Vidarbha, has been developed. The high correlation coefficient of the developed models will help to estimate optimum size of ruminants in different regions as per carrying capacity of GLS at different

methane emission level. The result also indicates that the highest GHG emission (5176.44 lakh kg/annum) occurs in Western Maharashtra, followed by Vidarbha and Marathwada. Although Vidarbha ranks second highest in methane emission, the need for reduction of animal population in percentage terms is the lowest due to non-over saturation of carrying capacity of GLS. The highest percentage reduction (60%) is needed for western Maharashtra as the area of the available GLS is less to support the present over size of ruminants.

016. Sharma, R.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Gandotra, V. K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prabhakar, S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Nanda, A.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effect of housing management on reproductive efficiency of buffaloes. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 768-770
KEYWORDS: WATER BUFFALOES. ANIMAL HOUSING. ANIMAL HUSBANDRY METHODS. ANIMAL HUSBANDRY. REPRODUCTIVE PERFORMANCE.

Data on 1690 buffaloes were collected randomly through a questionnaire to assess the relationship between degree of housing management (Housing Index) and postpartum reproductive efficiency of buffaloes. Buffaloes were declared anoestrus when they failed to exhibit oestrus till 60 days postpartum. The postpartum acyclic period was defined as the length of period (in days) between day of calving and first appearance of heat signs. The data was analyzed by ANOVA, t -test and linear regression. Buffaloes raised under good, medium and poor housing conditions required 55.2 ± 6.19 , 87.1 ± 3.52 and 139.5 ± 6.26 days, respectively, to show first oestrus after calving. The proportion of buffaloes remaining anoestrus was 38.6, 54.8 and 71.1%, respectively. There was a significant linear relationship between Housing Index and acyclic period. The data was also analysed after splitting it into two seasons—summer and winter. Housing management significantly affected the postpartum reproductive efficiency of buffaloes during both the seasons.

017. Madke, P.K.; National Dairy Research Institute, Karnal (India). Lathwal, S.S.; National Dairy Research Institute, Karnal (India). Singh, Yajuvendra; National Dairy Research Institute, Karnal (India). Anil Kumar; National Dairy Research Institute, Karnal (India). Kaushik, Vinay; National Dairy Research Institute, Karnal (India). Study of behavioural and physiological changes of crossbred cows under different shelter management practices. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 771-774
KEYWORDS: COWS. CROSSBREDS. CATTLE SHEDS. ANIMAL HOUSING. PHYSIOLOGICAL FUNCTIONS.

The effect of various kinds of shelter modifications in different seasons, viz. hot dry, hot humid and winter on physiological and behavioral responses of Karan Fries crossbred cows were studied in the present investigation. The mean rectal temperature, respiration rate per min, pulse rate per min and skin temperature in hot dry and hot humid seasons were significantly higher in group 1 with concrete flooring (G1), while in winter these were higher in groups with rubber mattress (G2) and straw bedding (G3). The time spent on feeding and rumination was significantly higher in G3 group with significantly low feeding temperament score. Significantly higher resting time and higher weight gain was observed in G3 as compared to G2 and G1. The study indicated that thatch roof and sand bedding in hot seasons and straw bedding in winter proved to be the most comfortable for crossbred cows in northern India.

018. Rajkumar, V.; Central Institute for Research on Goats, Makhdoom (India). Agnihotri, M.K.; Central Institute for Research on Goats, Makhdoom (India). Das, A.K.; Central Institute for Research on Goats, Makhdoom (India). Ramachandran, N.; Central Institute for Research on Goats, Makhdoom (India). Singh, D.; Central Institute for Research on Goats, Makhdoom (India). Effect of age on carcass characteristics and meat quality of Sirohi goat kids reared under semi-intensive and intensive management systems. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 775-780
KEYWORDS: KIDS. GOATS. CARCASS COMPOSITION. ANIMAL HUSBANDRY METHODS. INTENSIVE HUSBANDRY. LARGE SCALE HUSBANDRY. ANIMAL HOUSING.

Performance of male Sirohi goat kids reared under intensive (N=18) and semi-intensive (N=18) management systems was studied. Nine kids from each group were slaughtered at 9 and 12 months of age to study the carcass traits, meat production profile and quality. Kids under intensive feeding were offered concentrate (200g/head/day), seasonal green fodder (1 kg) and ad lib. dry roughages. Under semi-intensive system, kids were allowed 4–5 h daily grazing and supplemented with 100 g concentrate with ad lib. dry roughages. Kids reared under intensive system attained 28.47 kg slaughter weight (SW), i.e.16.11% more as compared to 24.52 kg under semi-intensive system at 9 months. At 12 months of age, increase slaughter weight was 15.92%. Hot carcass weight and dressing percentage were significantly ($P<0.01$) higher between two management systems at the age of 12 months. Depot fat particularly, omental fat weight, was significantly ($P<0.05$) higher under intensive management system than under semi-intensive system in both the age groups. Rearing system did not affect many of the meat quality traits (water holding capacity, water activity and extract release volume) in both the age groups. pH (5.53 vs 5.76) and titrable acidity (3.56 vs 3.86) were significantly different between rearing system at 9 months of age. Meat of intensively managed kids had lower moisture (73.69, 70.63) and higher fat content (5.88, 9.27) but similar protein and ash content, compared to semi-intensive managed kids in both the age group. Intensive managed kids meat had slightly higher cholesterol content (70.17mg/100 g) than semi-intensive systems (65.80 mg/100 g). Total body fat was also significantly ($P<0.01$) higher. It is concluded that Sirohi goat kids were more suitable for quality and quantity chevon (goat meat) production slaughtered at 9 months of age under intensive system and 12 months of age under semi-intensive system.

019. Roy, P.K.; National Dairy Research Institute, Nadia (India). Chatterjee, A.; National Dairy Research Institute, Nadia (India). Effect of different types of dairy cattle shelters on micro-climatic variable in rural West Bengal. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 781-784 KEYWORDS: COWS. MICROCLIMATE. CLIMATE. ANIMAL HOUSING. WEST BENGAL.

The study was conducted to find out the impact of different shelter types on environmental variables. Five different types of housing systems namely; Shelter-1: GI sheet roof with brick/mud floor with no surrounding wall; Shelter-2: GI sheet roof with brick/Rcc floor and brick/jute stick wall; Shelter-3: Tile roof with brick floor and no wall; Shelter-4: Tile roof with brick floor and brick/jute stick wall, and Shelter-5: Polythene sheet roof with mud floor and jute stick wall were selected in two villages. The inside maximum and minimum temperatures, wet and dry bulb temperatures of all the shelter system were recorded. Season significantly influenced ($P<0.01$) maximum and minimum temperatures, relative humidity and temperature humidity index (THI) of different housing systems. Shelter-4 had lower maximum temperature ($P<0.01$) as compared to shelter-1. THI and RH values were lower in shelter-3 during all the seasons as compared to other housing systems indicating thereby more thermally comfortable environment. Shelter-1 and 2 had higher maximum temperature, THI and RH and also involved higher cost of construction than tile roof. Animals kept in shelter-5 were uncomfortable due to higher maximum temperature in all seasons and the maximum temperature was higher even during winter season. Cows maintained in shelter 3 produced significantly more milk in comparison to cows maintained in other housing systems. It was concluded that shelter-3 could be made more comfortable by giving provision of adequate ventilation, regular water bath and adequate drinking water and feed formulations to sustain productivity of cows in summer.

020. Rathore, R.S.; Chaudhary Charan Singh University, Meerut (India). Rajbir Singh; Chaudhary Charan Singh University, Meerut (India). Kachwaha, R.N.; Chaudhary Charan Singh University, Meerut (India). Ravinder Kumar; Chaudhary Charan Singh University, Meerut (India). Existing management practices followed by the cattle keepers in Churu district of Rajasthan. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 798-805 KEYWORDS: DAIRY FARMS. ANIMAL HUSBANDRY METHODS. RAJASTHAN.

The study was conducted in Churu district of Rajasthan to acquire first hand information on existing breeding, feeding and housing management practices for dairy cattle. It was observed that 86.00% of the respondents resorted to natural service, 61.75% inseminate their cows at an early heat stage. Significantly more (82.00%) respondents believed in quacks treatment for anoestrous/repeaters animals and only 4.25% cattle

keepers followed pregnancy diagnosis. Regarding feeding practices, majority of the farmers followed group feeding (68.75%) and grazed in fallow/harvested field (65.25%). Home prepared concentrate mixture (60.50%) with soaking (78.50%) was prevalent in the area. Only 17.25 and 32.25% of the respondents incorporated mineral mixture and common salt in concentrate mixture, respectively. All the cattle keepers had kutchra floor in shed and 58.50% kept their cattle near dwelling house. Thatched (70.50%) and single slope roof (45.50%) was observed in study area. None of the respondents followed grooming practice. The results indicated that knuckling (81.75%) was the main method of milking. All the respondents, clean udder and teats and wash hand before milking. None of the cattle keepers did dry hand milking and sealing of teat canal at the end of lactation. More than half (53.50) of the respondents fed colostrum to newly born calf within 2 h. All the respondents attended the calf at the time of calving and 96.25% cattle keepers cut and disinfected the naval cord of calf. Only few respondents dehorned and castrated the calf. Regarding sick animal treatment, 82.00% cattle keepers preferred first quacks then vety. doctor/stock man. Only 14.25% of the respondent followed vaccination and deworming practice. Majority (65.50%) of the cattle keepers isolated their sick animals from healthy animals. Water trough and manger was cleaned at weekly interval by 78.00% respondents, while animal shed was cleaned daily by 91.50% cattle keepers.

021. Ganai1, T.A.S.; Sher-e- Kashmir University of Agricultural Sciences and Technology, Srinagar (India). Misra, S.S.; Sher-e- Kashmir University of Agricultural Sciences and Technology, Srinagar (India). Sheikh, F.D.; Sher-e- Kashmir University of Agricultural Sciences and Technology, Srinagar (India). Gurez - a threatened sheep breed of Kashmir. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 806-808
KEYWORDS: SHEEP. BREEDS (ANIMALS). LAND RACES. JAMMU AND KASHMIR.

The present study was the first systematic documentation of Gurez breed of sheep in its actual breeding tract. The knowledge gathered from this study will be immensely helpful in developing plans for package of managemental practices, breeding plan and conservation of this unique animal genetic resource found in the northern part of our country. The farmers are rearing the animals of this breed of their own and no breed improvement programme has been undertaken in the breeding tract. As the population size of this breed is very small, inbreeding and crossbreeding with other sheep of the area pose big threats in near future. Thus, awareness programmes for educating the farmers regarding better feeding, managemental, healthcare practices, and proper breeding techniques to be followed will help in development of a sustainable and profitable sheep rearing system for this breed.

022. Shinde, N. V.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Mote, M.G.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Khutal, B.B.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Jagtap, D.Z.; Mahatama Phule Krishi Vidyapeeth, Rahuri (India). Prediction of lifetime milk production on the basis of lactation traits in Phule Triveni crossbred cattle. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 986-988
KEYWORDS: DAIRY CATTLE. CROSSBREDS. LAND RACES. MAHARASHTRA. MILK YIELD. MILK PERFORMANCE. MILK YIELD.

The data on early lactation traits, production efficiency traits of Phule Triveni Cows maintained at the MPKV, Rahuri (Maharashtra) from 1978 to 2007 were used to predict lifetime milk production up to third lactation. Set-I consisting of 2 out of 7 for first lactation traits the best equation under multiple regression models explained 50.91% accuracy of prediction in LTP-3. The best equation under Set-II containing 3 out of 11 for first and second lactation traits showed 74.28% accuracy. When only production efficiency traits were incorporated in the prediction equation then the best equation having 3 out of 6 production efficiency traits explained 48.70% accuracy of prediction. The optimum equations under Set-IV including 4 out of 17 traits for LTP-3 lactation explained 88.03% accuracy of prediction. It was observed that the inclusion of production efficiency traits along with first and second lactation traits in an equation showed significant increase in R^2 value.

023. Das, A.K.; Central Institute for Research on Goats, Makhdoom (India). Rajkumar, V .; Central Institute for Research on Goats, Makhdoom (India). Comparative study on carcass characteristics and meat quality of three Indian goat breeds. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1014-1018
KEYWORDS: GOATS. CARCASS COMPOSITION. MEAT. QUALITY.

Barbari (10), Jamnapari (6) and Marwari (4) male goat kids were reared under semi-intensive management system and slaughtered at 13 month to study the differences if any, in the carcass and meat quality traits. pH, water holding capacity, cooking loss, shear force value, cholesterol content and sensory attributes of Longissimus dorsi (LD) and Semimembranosus (SM) muscles were assessed for comparative meat quality evaluation. Study revealed that breed has no significant effect on slaughter weight. All the parameters except dressing percentage and fore cannon were nonsignificant among the 3 breeds. Jamunapari had marginally heavier carcass weight and higher dressing percentage. Marwari had the lowest back fat (1.00 mm) and breast fat (2.17 cm) thickness. Loin eye area was moderately higher in Jamunapari (8.62 cm²) followed by Barbari (8.45 cm²) and Marwari (7.38 cm²). The weight of cut portion of leg, loin, rack and breast and shank was marginally higher in Jamunapari kids. There were no significant differences between breeds and muscles in meat chemical composition among three Indian goat breeds. Marwari goats had marginally higher ultimate pH (5.71, 5.79) values than those from Barbari (5.67, 5.72) and Jamunapari (5.63, 5.69) goats. Cooking loss percentage from the 3 breeds ranged from 36.0 to 38.0% with little differences between the 3 breeds and muscles. Barbari goat muscles had lower mean cholesterol (68.38 mg/100 g) content than Jamunapari (71.76) and Marwari goats (73.45). No significant difference was found between the breeds and muscles with regard to meat tenderness, juiciness and flavour. Barbari received better overall acceptability scores over other two breeds.

024. Sabapara, G. P.; Navsari Agricultural University, Navasari (India). Desai, P.M.; Navsari Agricultural University, Navasari (India). Kharadi, V. B; Navsari Agricultural University, Navasari (India). Saiyed, L.H.; Navsari Agricultural University, Navasari (India). Rana, Ranjeet Singh; Navsari Agricultural University, Navasari (India). Housing and feeding management practices of dairy animals in the tribal area of South Gujarat. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1022-1027
KEYWORDS: DAIRY CATTLE. ANIMAL HOUSING. ANIMAL FEEDING. ANIMAL HUSBANDRY METHODS. GUJARAT.

A field survey was conducted to collect the first hand information on dairy animal management practices followed by the tribal dairy animal owners of Vansada taluka of Navsari district of South Gujarat. Existing housing and feeding management practices were studied through pre designed and pre tested questionnaire from 200 dairy animal owners. Close type of animal house was provided by 98% of the farmers. Kaccha type of floor was observed in 87% of the houses. Earthen plates with thatched roof were present in 94% of the animal sheds and wooden poles were used to support roof in 85.5% of the houses. Pucca drainage facility of urine was found in only 6% of animal shed. Paddy straw was used as dry fodder by 98% of farmers. All the farmers provided green natural border grasses of cultivated plots and grasses from fellow land. In addition to this 75% of farmers grew fodder crops. None of the farmers practiced silage making. Concentrates was fed to the animals after milking by 91% of the farmers. Mineral supplements were provided by only 30.5% of farmers to their milch animals.

025. Rana, N.; Central Institute for Research on Buffaloes, Hisar (India). Khanna, S.; Central Institute for Research on Buffaloes, Hisar (India). Raut, A.A.; Central Institute for Research on Buffaloes, Hisar (India). Bhardwaj, S.R.; Central Institute for Research on Buffaloes, Hisar (India). Manuja, A.; Central Institute for Research on Buffaloes, Hisar (India). Manuja, B.; Central Institute for Research on Buffaloes, Hisar (India). Saini, A.; Central Institute for Research on Buffaloes, Hisar (India). Kakkar, S.; Central Institute for Research on Buffaloes, Hisar (India). Khurana, K.L.; Central Institute for Research on Buffaloes, Hisar (India). Sethi, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Retrospective epidemiological analysis of mortality trends in neonatal and growing Murrah buffalo calves at an organized herd. Indian Journal of Animal

Sciences (India). (Oct 2010) v. 80(10) p. 976-979 KEYWORDS: WATER BUFFALOES. EPIDEMIOLOGY. MORBIDITY. DISEASE SURVEILLANCE.

Retrospective epidemiological analysis based on necropsy examination of 467 buffalo calves (up to 1 year of age) from 1993–94 to 2006–07 was carried out to assess principal infectious causes of mortality in young calves. Neonatal mortality rate, sex-specific mortality rate and overall calf mortality rate due to various diseases or their syndromes were determined. Maximum mortalities (i.e. 7.03%) were observed in neonatal calves (1 month of age). Seasonal pattern revealed maximum mortalities during winters (40.00%), followed by that in the autumn (25.59%), summers (20.02%) and rainy (14.36%) seasons. The disease-specific mortality trends revealed that pneumoenteritis (29.17%), pneumonia (27.15%) and enteritis (24.75%), were the principal infectious causes, which together constituted about 80% of mortalities in buffalo calves.

026. Bhardwaj, R.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Randhawa, C.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Randhawa, S.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Incidence of iron deficiency in crossbred cow calves reared on pucca floor. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1037-1040 KEYWORDS: COWS. CROSSBREDS. FLOOR HUSBANDRY. TRACE ELEMENTS. NUTRIENT DEFICIENCIES.

A total of 115 crossbred cows calves (1–3 months age), reared on pucca floor, in and around the Ludhiana, Moga and Sangrur districts of Punjab, were sampled to record the prevalence of iron deficiency. Hemoglobin concentration and PCV was low in 52.2 and 62.6% of crossbred calves respectively. Plasma iron concentration was low in 45.2% of calves. Prevalence of iron deficiency and iron deficiency anaemia was 45.2 and 27.8% respectively, in calves reared on pucca floor. Iron deficiency anaemia was substantiated by a treatment trial of iron dextran on 9 iron deficient anemic cow calves of 4–8 weeks age, which were administered 2 injections of iron dextran 50 mg by deep intramuscular route weekly. Mean values of Hb, PCV, plasma Fe concentration and percent transferrin saturation increased significantly by the day 15th of treatment. Total iron binding capacity showed significant decrease on the day 7th and 15th of treatment. It was concluded that 2 injections of iron dextran 50 mg at weekly interval were effective in ameliorating the anaemia in crossbred cow calves. It was hypothesized from this study that iron deficiency is common in cow calves of 1–3 months of age and they should be supplemented with iron orally or parentally.

027. Madhavi, K.; S. V. Veterinary University, Hyderabad (India). College of Veterinary Science. Reddy, T.J.; S. V. Veterinary University, Hyderabad (India). College of Veterinary Science. Reddy Y. Ramana; S. V. Veterinary University, Hyderabad (India). College of Veterinary Science. Reddy, G. V. N.; S. V. Veterinary University, Hyderabad (India). College of Veterinary Science. Growth Rate and Carcass Characteristics of Nellore Ram Lambs Fed on Differently Processed and Detoxified Neem (*Azadirachta indica*) Seed Cake Incorporated Complete Diets. Animal Nutrition and Feed Technology (India). (Jul 2010) v. 10(2) p. 201-206 KEYWORDS: LAMBS. NEEM EXTRACTS. OILSEED CAKES. CARCASS COMPOSITION.

A complete diet formulated with detoxified neem (*Azadirachta indica*) cake was processed into three different physical forms viz. mash, expander-extruded pellets and steam pellets. These three diets were compared with a conventional ration in a 180-day growth trial using twenty four Nellore ram lambs (18.81 ± 0.5) divided into four groups of six lambs each in a completely randomized design. The average daily gain was significantly ($P < 0.05$) higher on pelleted diets in comparison to that on control and mash diets. No significant ($P < 0.05$) differences with regard to dressing percentage, primal cuts, proportion of lean, bone and fat, and edible and inedible ratio could be observed due to incorporation of detoxified neem seed cake. Further, pelleting the diet decreased the feed cost per kg gain by 14.95 to 15.50 and 10.93 to 11.5 per cent compared to control and mash diets. Hence, neem seed cake can be incorporated into complete diet after detoxification without any deleterious effect on growth and meat quality. Among the processing methods expander-extruder processing cost can be preferred over steam pelleting because of low processing as compared to steam pelleting.

L02 Animal Feeding

028. Singh, R.K.; University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition, Mishra, S.K.; University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition, Swain, R.K.; University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition, Dehuri, P.K.; University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition, Sahoo, G.R.; University of Agriculture and Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Animal Nutrition. Mineral profile of feeds, fodders and animals in mid-central table land zone of Orissa. *Animal Nutrition and Feed Technology (India)*. (Jul 2011) v. 11(2) p. 177-84 KEYWORDS: FEEDS. ANIMALS. MINERALS. BIOCHEMISTRY.

Sample of feeds and fodders and serum samples of cows in eight villages, two from each block and two blocks from each of the two districts namely Dhenkanal and Angul of mid-central table land zone (MCTLZ) of Orissa were collected and analysed for macro and micro mineral content. Among the fodders, paddy straw was found to be deficient in calcium, phosphorus and manganese. Deficiency of P was observed in most of the fodders. Most of the concentrate found to contained higher level of the analysed minerals. The average serum Ca, P, Zinc, copper, Mn and iron content of cows in MCTLZ were found to be 6.91 ± 0.13 mg/dl, 3.25 ± 0.08 mg/dl, 0.78 ± 0.02 ppm, 0.70 ± 0.01 ppm, 0.29 ± 0.01 ppm and 2.17 ± 0.06 ppm, respectively. The percentage of animals deficient in serum Ca, P, Zn, Cu and Mn were observed to be 69.1, 83.3, 29.1, 44.1 and 8.3 percent, respectively. The serum mineral content of the animals of MCTLZ was found to be deficient in Ca, P, Zn and Cu. The serum glucose, cholesterol, protein, albumin and globulin content of the animals in MCTLZ were 38.06 ± 1.08 mg/dl, 64.26 ± 2.13 mg/dl, 4.42 ± 0.10 g/dl, 2.26 ± 0.06 g/dl and 2.16 ± 0.07 g/dl, respectively. Based on the study, supplementation of deficient minerals viz Ca, P, Zn and Cu and protein and energy in the diet of cattle under existing feeding practices in MCTLZ of Orissa is imperative for better health and productivity.

029. Bajaj, G.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Dhaliwal, P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Hundal, J.S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Choubey, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effect of induced oxalate toxicity by ad libitum feeding of Napier grass (*Nennisetum purpureum*) on health of buffalo calves. *Animal Nutrition and Feed Technology (India)*. (Jul 2011) v. 11(2) p. 241-48 KEYWORDS: OXALATES. TOXICITY. PENNISETUM PURPUREUM. WATER BUFFALOES. HYPOCALCAEMIA.

The present study was taken up to evaluate the effect of oxalate toxicity on health of male buffalo calves. Oxalate toxicity was experimentally induced by ad lib feeding of overgrown Napier grass (above 125 cm) with deprivation of water. The haemato-biochemical, physiological and ruminal parameters were recorded at zero day of experiment were taken as control values. The crude protein, neutral detergent fibre and total oxalate content of overgrown Napier grass were varied from 6.69% to 4.35%, 63.0% to 69.8% and 1.80% to 2.43% respectively. Feeding of overgrown Napier grass declined rumen protozoa concentration from ++++ to + and decreased ($P < 0.01$) rumen motility (2.80/2 min to 0.00/2 min) on 44th day of experiment in addition to the altered body temperature, pulse rate and respiration rate. The leukocyte count of calves increased ($P < 0.01$) from 9.68 to $16.92 \times 10^3/\text{mm}^3$ with significantly decrease in packed cell volume from 31.80 to 26.67 and slight increase in hemoglobin from 10.47 to 10.92 g/dl. Rise ($P < 0.01$) in plasma creatinine from 0.81 to 1.79 mg/dl and blood urea nitrogen from 8.90 to 12.88 mg/dl were also observed with slight increase in aspartate aminotransferase enzyme activity at the peak of experiment. The significant ($P < 0.01$) decreases in plasma calcium level from 9.13 to 6.19 mg/dl along with decrease in inorganic phosphorus level (from 5.72 to 3.94 mg/dl) lead to hypocalcaemia. Hence, it was concluded that oxalate toxicity decreases rumen protozoa concentration, plasma calcium and phosphorus level leading to hypocalcaemia resulted in significant reduction of rumen motility and consequently develops rumen impaction in calves.

030. Sheikh, I.U.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar (India). Barman, Keshab; NRC on Pig, Guwahati (India). Effect of fish meal supplementation on economy of feeding crossbred Jersey calves. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 683-685 KEYWORDS: COWS. CROSSBREDS. SUPPLEMENTS. FISH MEAL.

Crossbred Jersey calves (15), 2–3 month-old, were randomly divided into 3 groups of 5 each and fed on 3 different types of calf starter rations containing 0 (T₀), 8 (T₁) and 25% (T₂) of fish meal to assess growth performance and economy of feeding. The calves were fed calf starter rations twice daily ad lib. and allowed 4h grazing in the morning (10 AM to 12 PM) and in the evening (2 to 4 PM). The average dry matter intake (kg/d) was not significantly different. However, the total dry matter intake (kg) was significantly lower in higher FM supplemented group (T₂) than the other groups. The average live weight gain (g/day) was significantly higher in calves supplemented with FM. The feed conversion efficiency was higher in 25% (T₂) fish meal supplemented group than T₀ and T₁ groups. The cost of production per kg live weight (Rs) was significantly lower in fish meal supplemented groups. It is concluded that cost of feeding can be reduced by supplementation of fish meal in calf starter ration.

031. Ghosh, S.; National Dairy Research Institute, Karnal (India). Mehla, R.K.; National Dairy Research Institute, Karnal (India). Sirohi, S.K.; National Dairy Research Institute, Karnal (India). Tomar, S.K.; National Dairy Research Institute, Karnal (India). Roy, B.; National Dairy Research Institute, Karnal (India). Performance of crossbred calves with dietary supplementation of garlic extract. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 690-692 KEYWORDS: CALVES. CROSSBREDS. ANIMAL FEEDING. GARLIC. SUPPLEMENTARY FEEDING.

Twelve calves (Holstein cross) in their pre-ruminant stage were used to study effect of garlic extract feeding on their performance and they were randomly allotted into treatment and control groups in equal number. Treatment group received garlic extract supplementation 250 mg/kg BW/day/calf. Performance was evaluated by measuring average body weight (BW) gain, nutrient intake (DM, TDN and CP), feed conversion efficiency (DM, TDN and CP), fecal score, fecal coliform count and feed cost of rearing. There was significant increase in average body weight gain and feed intake and significant decrease in severity of scours as measured by fecal score in the treatment group compared to the control group. The results suggested that garlic extract can be supplemented to the calves for better performance.

032. Chaturvedi, O.H.; Central Sheep and Wool Research Institute, Avikanagar (India). Bhatta, R.; Central Sheep and Wool Research Institute, Avikanagar (India). Sankhyan, S.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Karim, S.A.; Central Sheep and Wool Research Institute, Avikanagar (India). Nutrient utilization and production performance of lambs grazing on community rangeland with and without concentrate supplementation. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 693-696 KEYWORDS: LAMBS. GRAZING. RANGELANDS. ANIMAL PERFORMANCE. NUTRITION PHYSIOLOGY. SUPPLEMENTS.

Male lambs (20), 2–3 months age and weighing 10.15±0.0432 kg were selected and randomly divided into 2 groups of 10 each (G1 and G2). Lambs in both the groups were grazed on natural rangeland from 07.00 to 18.00 hr, followed by night shelter in the animal shed. G2 lambs were maintained on sole grazing while lambs in G1, in addition to grazing received concentrate mixture 1.5% of their body weight. The mean biomass yield of the community rangeland was 13.8 q DM/ha. The roughage intake was similar between supplemented (G1) and non-supplemented (G2) group. However, there was significant difference in the total DMI, DCP and ME between G1 and G2. The digestibility of DM, OM, CP, NDF and ADF was higher in G1 as compared to G2. After 90 days of feeding, the body weight of lambs in G1 and G2 reached 21.64 and 18.74 kg, respectively. The average body weight gain and average daily gain in G1 was higher than that in G2 (8.63 kg and 95.9 g). The wool yield (g) and fibre characteristics, viz. hetro medullation (%), staple length (cm) and crimp per centimeter did not differ between the two groups. However, diameter (micron) and hairy medullation (%) were higher

($P < 0.05$) in G1 than that in G2. The cost: benefit ratio of the supplementary feeding was 1: 1.42. It is concluded from this study that the biomass yield of the community rangeland in semi-arid region of India is low and insufficient to meet the nutrient requirement of weaner lambs. However, concentrate supplementation 1.5% of the body weight to the lambs during this active phase of growth enhanced their growth rate for cost effective mutton production.

033. Sirohi, S.K.; National Dairy Research Institute, Karnal (India). Walli, T.K.; National Dairy Research Institute, Karnal (India). Mohanta, R.K.; National Dairy Research Institute, Karnal (India). Supplementation effect of bypass fat on production performance of lactating crossbred cows. *Indian Journal of Animal Sciences (India)*. (Aug 2010) v. 80(8) p. 733-736 KEYWORDS: COWS. CROSSBREDS. SUPPLEMENTARY FEEDING. LACTATION. MILK PERFORMANCE.

Lactating crossbred cattle (10) were randomly divided into 2 groups on the basis of milk yield (14–15 kg/day), day of calving (~50 days) to see the effect of bypass fat supplementation on nutrient utilization and production performance. Cows were fed wheat straw, concentrate mixture and green maize fodder in the control group and additional 300 g bypass fat was given in treatment group. Experimental feeding was continued up to 90 days after 2 weeks of adaptation. The average milk production and fat corrected milk yield per day was significantly higher in treatment group. Milk fat and total solids content were improved significantly in treatment group, whereas milk protein and solids-not-fat remained unaffected in both groups. The digestibility of nutrients except that of ether extract was comparable in both groups. Intake per kg of milk produced was lower in treatment group than the control group. Milk production efficiency was also significantly higher (30.22%) in bypass fat supplemented in comparison to the control group (27.03%). It was concluded that bypass fat supplementation 00 g/d/animal in medium producing crossbred cows significantly increased the milk production and fat corrected milk yield up to 15.61 and 24.01%, respectively, over the control group.

034. Das, M.M.; Indian Grassland and Fodder Research Institute, Jhansi (India). Sultan Singh; Indian Grassland and Fodder Research Institute, Jhansi (India). Mojumdar, A.B.; Indian Grassland and Fodder Research Institute, Jhansi (India). Comparative nutrient utilization and growth performance of Bhadawari and Murrah buffalo calves under grazing. *Indian Journal of Animal Sciences (India)*. (Aug 2010) v. 80(8) p. 741-744 KEYWORDS: WATER BUFFALOES. PASTURES. GRAZING SYSTEMS. NUTRITION PHYSIOLOGY. GROWTH RATE.

Comparative nutrient utilization and growth performance were studied in Bhadawari and Murrah buffalo calves (6 each) under grazing with supplementation of concentrate mixture (1% of body weight) and wheat straw ad libitum at stall from July to September. The pasture crude protein content reduced from 6.82% to 5.88% whereas NDF content increased from 69.54% to 72.27% with advancement of maturity of pasture from July to September. Total DMI was comparable in Bhadawari and Murrah buffaloes. DM intake from pasture was also comparable; however, pasture intake as percentage of total DMI was higher in Bhadawari than Murrah buffalo calves. Digestibility of DM, OM and CP were comparable in Bhadawari and Murrah buffalo calves. NDF and ADF digestibility were higher in Bhadawari than Murrah buffaloes though not statistically significant. DCP intake (g/d) was higher (271 vs 225) in July in both the breeds as compared to September (218 vs 197) whereas TDN intake was similar for both the periods. Daily live weight gain (g/d) was significantly higher in Murrah buffalo than Bhadawari buffalo calves. Thus it was concluded that nutrient utilization was similar under grazing with supplementation in both the breeds however, daily live weight gain was higher in Murrah when compared with Bhadawari buffalo calves.

035. Bakshi, M.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Wadhwa, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Hundal, J.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Nutritional status of animals in peri-urban dairy complexes in Punjab, India. *Indian Journal of Animal Sciences (India)*. (Aug 2010) v. 80(8) p.

745-749 KEYWORDS: WATER BUFFALOES. NUTRITIONAL STATUS. SUBURBAN AGRICULTURE. PUNJAB.

The study was taken up to assess the nutritional status of dairy animals in peri-urban dairy complexes in Punjab, India. About 24 to 29 dairy houses were selected randomly from each of Ludhiana (LDC), Amritsar (ADC), Jalandhar (JDC), Ferozepur (FDC) and Hoshiarpur (HDC) peri-urban dairy complexes. Buffaloes predominated in almost all peri-urban dairies, except in FDC. The animals of FDC had the lowest ($P<0.05$) and that of LDC had the highest body weight (478 vs. 572 kg). The milk yield of the animals of LDC was highest ($P<0.05$), while that of ADC was the lowest (9.65 vs. 5.96 kg/animal/day). The space allocated per adult cattle unit was highest in JDC and lowest in LDC, which was only 42 to 55% of the recommended area of 11.25 m²/adult cattle unit. Wheat bran was the most common feedstuffs used in the rations of lactating animals. Non-conventional feed resources like pulses chunni, brewery and starch industry waste played a significant role in peri-urban dairy production system. The CP and EE content in the diet of animals was less than the recommended level to the extent of 28 and 30%, 17 and 32%, 22 and 38%, 13 and 26%, 12 and 4% respectively in JDC, ADC, FDC, LDC and HDC. The NDF content in complete feed was 114 to 144% higher than the recommend level of 28%. The milk urea nitrogen (MUN) was lowest ($P<0.05$) in animals of FDC (8.1mg/dl) and highest in animals of HDC (20.8mg/dl). About 24, 14, 64, 83 and 50% of the dairy houses of JDC, ADC, FDC, LDC and HDC, respectively, offered DM less than the requirement. The daily consumption of nutrients was over and above the requirements in JDC, ADC and HDC, but less ($P<0.05$) than the requirement in LDC (22% DM, 18%CP, 15%DCP and 21%TDN) and FDC (5%DM, 8%CP, 11%DCP and 7%TDN). Only 3.6% of the dairy houses of FDC and 25% of the dairy houses of LDC offered mineral mixture to their animals, while mineral mixture was not offered at all in JDC, ADC and HDC. It was concluded that CP and EE content in the diet of the animals was less than the recommended levels in all the peri-urban dairy complexes in Punjab, but the daily consumption of nutrients was less than the requirements, only in LDC and FDC. The farmers need to be motivated to feed nutritionally balanced diet.

036. Gakhar, G.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Randhawa, S.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Randhawa, C.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Bansal, B.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Singh, R.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effect of copper on the milk quality and prevention of mastitis in dairy cows. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 727-728 KEYWORDS: DAIRY COWS. COPPER. SUPPLEMENTS. MASTITIS. DISEASE CONTROL.

To study the effect of copper on milk quality and prevention of mastitis, copper glycinate (75mg/ml) 2 ml/ animal was given subcutaneously in the brisket region, first before drying off followed by second injection at the same dose rate after parturition. Plasma and milk copper levels, and milk parameters, viz. bacteriology, CMT, EC, fat, SNF, total protein, lactose, density and pH were studied. A reduction in occurrence of postpartum mastitis in supplemented cows (50%) than unsupplemented control (70%) was seen. A slightly less marked increase in plasma copper and higher increase in milk copper levels and consistent increase in milk fat content was recorded in supplemented cows as compared to unsupplemented dairy cows.

037. Malik, P.K.; National Dairy Research Institute, Karnal (India). Singhal, K.K.; National Dairy Research Institute, Karnal (India). Deshpande, S.B.; National Dairy Research Institute, Karnal (India). Effect of lucerne fodder (first cut) supplementation on in vitro methane production, fermentation pattern and protozoal counts. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 998-1002 KEYWORDS: RUMINANTS. LUCERNE. GREEN FEED. METHANE FERMENTATION. METHANE. SAPONINS. IN VITRO EXPERIMENTATION.

The study was carried out to ascertain the effect of various levels of lucerne fodder (first cut) supplementation at 0 (T_0), 15 (T_1), 30 (T_2) and 45 (T_3) % to wheat straw and concentrate based diet on in vitro methane production, IVDMD, TVFA, molar proportion of VFA,s and protozoal counts. The roughage to

concentrate ratio was maintained as 60: 40 irrespective of the diet. Highest total gas production was recorded in treatment T₃ followed by T₂ and T₁, however, the lowest cumulative total gas production was recorded in control treatment (T₀). Cumulative gas production in treatment T₃ was significantly higher than that recorded in T₀. Total gas production from slowly fermentable fraction ranged between 118.80 (T₀) and 139.70 (T₃) litre/kg, DM in different treatments. The reduction in methane production was 15 and 18% in treatment T₂ and T₃, respectively. The DMD in treatments T₂ and T₃ was significantly higher than that recorded in treatment T₀. Total volatile fatty acid (TVFA) recorded as 105.58 and 107.93 Mm/litre in treatment T₂ and T₃, was significantly higher than that recorded in control treatment (101.43 Mm/litre). The acetate proportion was significantly lower in treatment T₃ as compared to the control and reverse trend was observed for the propionate production. Protozoal numbers (log cfu/ml) decreased significantly by the supplementation of first cut lucerne fodder at 30 and 45% level. Saponins containing feed may serve the purpose of methane mitigation from ruminants without giving any additional input as the farmers grow leguminous fodder traditionally. Thus, there is urgent need to explore the new feed resources containing saponin and fix the safe level of their inclusion in ration for achieving the goal.

038. Pailan, G.H.; Indian Grassland and Fodder Research Institute, Jhansi (India). Gupta, J.N.; Indian Grassland and Fodder Research Institute, Jhansi (India). Sharma, P.; Indian Grassland and Fodder Research Institute, Jhansi (India). Mahanta, S.K.; Indian Grassland and Fodder Research Institute, Jhansi(India). Effect of stylo meal supplementation in lactating buffaloes: An on-farm trial. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1031-1033 KEYWORDS: WATER BUFFALOES. LACTATION. FEED LEGUMES. STYLOSANTHES HAMATA.

An experiment was conducted to assess the effect of stylo meal supplementation on DM intake and milk yield in lactating buffaloes at the farmers field. Average daily dry matter intake in control and experimental groups was 10.31 kg and 10.37 kg, respectively. There was nonsignificant variation in the dry matter intake in terms of % body weight (2.09 vs 2.22). Supplementation of stylo meal significantly reduced the wheat straw intake in experimental buffaloes. Average daily milk yield in control and experimental groups was 7.80 and 8.00 litre, respectively. Chemical composition (%) of milk was similar in both the groups. The replacement of 1 kg concentrate mixture reduced the cost of ration by 5.73/day/buffalo with a marginal return of 2.80/day/buffalo. It was concluded that on dry matter basis 25% of concentrate mixture could be replaced by stylo meal without affecting milk yield and its composition in lactating buffaloes under on-farm condition.

039. Uttam Kumar; Birsa Agriculture University, Ranchi (India). Ravindra Kumar; Birsa Agriculture University, Ranchi (India). Patel, M.; Birsa Agriculture University, Ranchi (India). Sinha, A.P.; Birsa Agriculture University, Ranchi (India). Performance of crossbred pigs fed on niger seed cake. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1034-1036 KEYWORDS: SWINE. GUIZOTIA ABYSSINICA. ANIMAL FEEDING. ANIMAL PERFORMANCE. OILSEED CAKES.

Present work was conducted to study the performance of crossbred pigs fed on niger seed cake. Pigs (21) were divided into 3 groups (7 in each) fed with iso-caloric and isoproteinous diets. Group 1 (T₁) was fed with a standard concentrate mixture (with GNC) whereas, 50% GNC of T₁ diet was replaced by NSC (Guizotia abyssinica) in T₂ and 100% in T₃ diet. After 98 days of experimental feeding, the final body weights were higher in T₂ followed by T₃ and T₁ but the difference among groups was nonsignificant. The feed efficiency ratios recorded in the present studies (3.27 to 3.53) in T&D pigs are considered to be highly satisfactory and indicated that the efficiency of utilization of niger seed cake is equal to conventional cakes. The cost of feed per kg gain in body weight was highest in group T₁ followed by group T₂ and lowest in group T₃. Thus, ration T₃ worked out to be cheapest, followed by ration used in T₂ than T₁ groups.

040. Basade, Yasmeen; Directorate of Coldwater Fisheries Research, Bhimtal (India). Kohli, M.P.S.; Directorate of Coldwater Fisheries Research, Bhimtal (India). Influence of dietary thyroxine in deccan mahseer (Tor khudree Sykes) juveniles: Effect on growth performance and feed utilization. Indian Journal of Animal

Sciences (India). (Oct 2010) v. 80(10) p. 1041-1044 KEYWORDS: TOR KHUDREE. THYROXINE. NUTRIENTS.

The present study was conducted to investigate the effects of dietary thyroxine levels on growth performance and feed utilization of deccan mahseer juveniles. Under the experiment 5 replicate groups were fed 4 diets with increasing levels of thyroxine (0, 0.05, 0.075 and 0.10 mg/kg of diet) for 180 days. The weight gain (%), specific growth rate (SGR), feed conversion efficiency (FCE), protein efficiency ratio (PER), nutrient and gross energy efficiency, apparent digestibility coefficient (ADC) of protein and lipid were significantly higher in fish fed with lower level of thyroxine (0.05 mg/kg of diet) and significantly decreased in response to the increasing levels of dietary thyroxine (from 0.075 to 0.10 mg/kg of diet). The survivability of fish too at higher dose was significantly lower. In fish fed on low dietary thyroxine level digestive enzyme activity, viscero-somatic index (VSI), hepato-somatic index (HSI) and reno-somatic index (RSI) values were high and cranio-somatic index (CSI) value was low. Whole body protein, lipid and gross energy content and muscle RNA/DNA ratio followed a similar pattern as growth parameters in relation to dietary thyroxine levels. Suggesting that thyroxine at a lower dosage accelerated growth performance and feed utilization in deccan mahseer juveniles.

041. Palanivel, M.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Faculty Training in Animal Sharma K.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Faculty Training in Animal Dutta, Narayan; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Faculty Training in Animal Singh, Ana; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Faculty Training in Animal. Effect of Feeding Raw or Water Soaked Rapeseed-Mustard Cake on Nutrient Utilization and Growth Performance of Kids. Animal Nutrition and Feed Technology (India). (Jul 2010) v. 10(2) p. 157-167 KEYWORDS: KIDS. OILSEED CAKES. RAPESEED MEAL. RAPESEED. GROWTH RATE.

In order to assess the effect of feeding raw or water soaked rapeseed-mustard cake (RMC) based supplement on the performance of kids, eighteen male kids of 6 months old (BW 11.10±0.77 kg), were randomly assigned to 3 dietary treatments of 6 each, viz. GNC, RMC-dry and RMC-sani containing groundnut cake (GNC) as major protein source, 100% replacement of GNC with RMC and overnight water soaked (1:3 w/v ratio) RMC concentrate mixture fed as mixed ration (sani) with part of daily allowance of wheat straw, respectively for an experimental period of 180 days. The glucosinolates (GLS) content of RMC concentrate mixture was reduced by 31.96% after overnight water soaking. Feeding of RMC based diet in sani form reduced ($P<0.01$) the wheat straw and total DM intake as compared to other treatments. The digestibility coefficient of various nutrients did not differ significantly except, digestibility of OM and CP which were higher ($P<0.01$) in RMC-sani group. Intake and retention of N (g/d) was lower ($P<0.05$) in RMC fed groups as compared to GNC. TDN intake (g/kg $W^{0.75}$) was lower ($P<0.01$) for both RMC fed groups as compared to GNC; however, DCP intake (g/kg $W^{0.75}$) was higher ($P<0.05$) in RMC-sani. The Glucosinolates (GLS) intake (imol/kg $W^{0.75}$) by kids was lower ($P<0.01$) in RMC-sani as compared to RMC-dry. Total weight gain (kg) and average daily gain (g/d) by kids were higher ($P<0.01$) in GNC followed by RMC-dry and RMC-sani, respectively. Mean levels of Hb, total serum protein, albumin and glucose were lower ($P<0.01$) and that of total cholesterol and serum thiocyanate were higher ($P<0.01$) in RMC fed groups. Serum T_3 hormone did not differ ($P<0.05$) among the treatments while that of T_4 hormone was lower ($P<0.05$) in RMC-dry as compared to GNC. It may be concluded that despite reduction in GLS content of RMC by overnight water soaking, its feeding as mixed ration (sani) did not improve the performance of kids.

042. Srinivas, Bandla; Central Sheep and Wool Research Institute, Avikanagar (India). Sankhyan, S.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Optimum Nitrogen and Energy Retention in Ewes and Foetal Growth in the Late Gestation on Concentrate Supplementation. Animal Nutrition and Feed Technology (India). (Jul 2010) v. 10(2) p. 187-194 KEYWORDS: EWES. CONCENTRATES. SUPPLEMENTARY FEEDING. EMBRYONIC DEVELOPMENT.

Average and marginal efficiency of utilization of N and energy by breeding ewes from 75 d of gestation was studied by feeding varying levels of concentrate supplement (CS) to guar straw in 1 (EG₁), 2 (EG₂), 3 (EG₃) and 5 (EG₄) multiples of recommended requirement. Control group (CG) was kept alone on guar straw. Guar straw intake was reduced ($P<0.01$) with higher level of CS in EG₄. Average and marginal efficiency of N retention was higher in EG₁ and energy retention was higher in EG₃. Optimum level of CS was in the range of EG₁ to EG₃, beyond which N and energy retention by ewe was inefficient. No significant difference in the net protein and energy retention by the foetus during subsequent fortnight from 90 d of gestation. Although N and energy retention by ewe was negative in CG, foetal protein and energy retention was not affected. Actual birth weight of the lambs was lesser than the predicted birth weight in CG, EG₁, EG₂ and EG₄ but contrary was true for EG₃ that may be due to higher average and marginal efficiency of N and energy utilization by ewe. Maternal weight loss in CG and EG₄ indicated that both under and over feeding will not yield better lamb weights. In conclusion, threshold level of CS required to breeding ewe was 100 g/d. CS of 300 g/d on fresh basis was optimum for higher marginal efficiency of maternal N and energy retention beyond which there was inefficiency in maternal system.

043. Bashir, Khalid; Barkatullah University, Bhopal (India). Department of Applied Aquaculture. Patil, S.; Barkatullah University, Bhopal (India). Department of Applied Aquaculture. Ganai, A.M.; Barkatullah University, Bhopal (India). Department of Applied Aquaculture. Effect of Formulated Feeds with Different Protein Levels on Performance of Koi carp (*Cyprinus carpio* var. koi). *Animal Nutrition and Feed Technology* (India). (Jul 2010) v. 10(2) p. 195-200 KEYWORDS: CYPRINUS CARPIO. CARP. FEEDS. INGREDIENTS. CARCASS COMPOSITION.

Koi carp (*Cyprinus carpio* var. koi) were reared for 60 days in the laboratory under five dietary treatments (A, B, C, D and E) with varying crude protein levels. Diet A; was commercial pelleted feed (CP 30.30%), while diets B, C, D and E were formulated from locally available feed ingredients having CP percentage of 24.4, 27.23, 35.24 and 43.00, respectively. There was significant ($P<0.01$) difference in body weight gain of Koi carp with values 27.55 ± 0.03 g, 28.72 ± 0.06 g, 30.7 ± 0.2 g, 33.62 ± 0.5 g and 38.0 ± 0.04 g in treatment A, B, C, D and E, respectively. The highest body weight gain was observed in treatment E (38.02 ± 0.04 g) and lowest in treatment A (27.55 ± 0.32 g). The feed conversion ratio (FCR) and specific growth rate (SGR) showed significantly ($P<0.05$) better performance in treatment E. Digestibility of nutrients viz; crude protein (CP) and ether extract (EE) were significantly ($P<0.05$) higher for diet E and D. Commercial pelleted feed (treatment A) was cost intensive compared to formulated feeds. The body composition of fish showed significant differences ($P<0.05$) in protein and lipid content with highest protein and lipid content in treatment E (64.84 & 23.97) and D (64.09 & 21.86). The gross energy (k cal/g) content of the body showed the same trend. The water quality parameters (temperature, pH, dissolved oxygen and total alkalinity) were within normal range. It was concluded that for growing stages of Koi carp a crude protein level of 35.44 to 43.0 percent was better for growth and carcass composition.

044. Yasothai, R.; Veterinary College and Research Institute, Namakkal (India). Department of Animal Nutrition. Mohan, B.; Veterinary College and Research Institute, Namakkal (India). Department of Animal Nutrition. Ravi, R.; Veterinary College and Research Institute, Namakkal (India). Department of Animal Nutrition. Effect of Feeding Sesame Oil Cake (*Sesamum indicum* L.) by Replacing Protein Concentrate Mixture on the Performance of Broilers. *Animal Nutrition and Feed Technology* (India). (Jul 2010) v. 10(2) p. 207-218 KEYWORDS: BROILER CHICKENS. SESAME. OILSEED CAKES. DRESSING PERCENTAGE.

Day-old chicks ($n=240$), randomly allotted to eight treatment groups in duplicate of fifteen chicks each, were used in the study for 6 weeks. The sesame oil cake was included at different levels viz., 0% (T), 5% (T), 7.5% (T), 10% (T), 12.5% (T), 15% (T), 17.5% (T) and 20% (T) in broiler rations by replacing the protein concentrate mixture. At the end of 6 weeks, there was a linear increase in weight gain as the level of sesame oil cake increased from 0–15% (T₁ to T₆) and the weight gain ($P<0.05$) and feed efficiency was superior at 15% sesame oil cake inclusion level (1495 g and 1.98) compared to control diet (1379 g and 1.99). The blood profile

of broilers fed sesame oil cake revealed a non-significant reduction in total lipids, cholesterol and low density lipoprotein (LDL) and increase in the high density lipoprotein (HDL) content as the level of sesame oil cake increased in the ration. The blood calcium ($P<0.05$) and phosphorus ($P<0.01$) content were also significantly reduced as the level of sesame oil cake increased in the ration. The dressing percentage and weight of liver, heart, gizzard, spleen and abdominal fat were not affected in sesame oil cake fed birds. The overall ranking of the taste of the broiler breast meat increased linearly to the level of inclusion of sesame oil cake from 5 to 15% (T_2 to T_6) in the ration. A maximum profit of 32 paise/kg live weight was obtained in broilers fed 17.5% (T_7) sesame oil cake in the ration. Based on the overall performance and cost effectiveness, inclusion of sesame oil cake up to 15% (T_6) level in broiler starter and finisher ration is recommend.

045. Prasad, Rajendra; Central Sheep and Wool Research Institute, Avikanagar (India). Chaturvedi, O.H.; Central Sheep and Wool Research Institute, Avikanagar (India). Misra, A.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Mishra, A.S.; Central Sheep and Wool Research Institute, Avikanagar (India). Tripathi, M.K.; Central Sheep and Wool Research Institute, Avikanagar (India). Raghuvansi, S.K.S.; Central Sheep and Wool Research Institute, Avikanagar (India). Jakhmola, R.C.; Central Sheep and Wool Research Institute, Avikanagar (India). Effect of Different Energy Sources on Feed Fermentation and Nutrient Utilization in Sheep Fed Mustard Straw Based Complete Diets. *Animal Nutrition and Feed Technology (India)*. (Jul 2010) v. 10(2) p. 219-228 KEYWORDS: SHEEP. NUTRIENT INTAKE. MOLASSES. NUTRITION PHYSIOLOGY. STRAW. COMPLETE FEEDS.

The study was conducted on 20 yearlings Bharat Merino rams, divided randomly into 4 groups of 5 animals each. Four complete diets were prepared using two types of mustard straw (untreated, UMS: 60% or 2% sodium hydroxide treated, TMS: 60%) as roughage source and two energy sources (barley, BR: 10% or molasses, MOL: 10%). The feeding was continued for 28 days followed by 7 days metabolism trial. Dry matter intake from complete diets containing TMS was higher (36%) than those contained UMS. Intakes of organic matter, crude protein and cell wall constituents were also higher ($P<0.05$) in TMS based diets than that of UMS based diets. The energy source in the form of molasses or barley did not have any effect on the intake or digestibility of nutrients. The rams fed on TMS based diets had higher ($P<0.01$) rumen pH than those on UMS containing diets. Addition of molasses in the diet favoured the production of propionate and butyrate in the rumen of sheep. The production of microbial nitrogen as percent of total rumen nitrogen was facilitated both by alkali treatment and addition of barley in the diets. It is inferred that treatment of mustard straw with alkali improved intake of dry matter and other nutrients. In the same way addition of energy in the form of molasses enhanced rumen fermentation with high rumen total-N and $\text{NH}_3\text{-N}$.

046. Waje, S.H.; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Singh, S.K.; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Mudgal, Vishal; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Effect of Using Forest Grass Based Complete Rations on Growth and Nutrient Utilization in Growing Crossbred Calves. *Animal Nutrition and Feed Technology (India)*. (Jul 2010) v. 10(2) p. 229-234 KEYWORDS: CALVES. CROSSBREDS. COMPLETE FEEDS. GRASSES. NUTRITION PHYSIOLOGY.

Three mixed forest grass (*Themeda quadrivalvis*, *Dichanthium aristatum* and *Dichanthium annulatum*) based rations were evaluated in the diet of crossbred female calves. Eighteen crossbred female calves (body weight, 66.44 ± 0.51 kg) were divided into three equal groups and fed in the form of conventional feeding system (mixed forest grass and concentrate mixture separately, T_1), total mixed ration (TMR, T_2) or pelleted ration (T_3) for a period of 45 days including a digestion trial of 7 days. DM, protein and energy intake as well as digestibility of OM, CF and NFE were higher ($P<0.05$) when ration was provided either pelleted or TMR form as compared to conventional feeding system. The improvement ($P<0.05$) in the digestibility of dry matter, crude protein and ether extract in pelleted form was higher ($P<0.05$) to that of TMR and the digestibility in TMR was also remained higher ($P<0.05$) to their conventional counterpart. Pelleting of ration also showed improvement

($P < 0.05$) in the growth rate of crossbred calves as compared to calves fed either conventional or TMR diets. The cost of feeding/kg body weight gain remained comparable among the three groups. It may be concluded that pelleting is a practical method of densification and is useful for nutritional improvement of a diet.

047. Singh, Jaswinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Sikka, S.S. Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effect of Supplementation of Vitamin D3 at Varying Dietary Calcium: total phosphorus Ratio in diets Supplemented with Phytase on Growth Performance of Broiler Chicks. *Animal Nutrition and Feed Technology (India)*. (Jul 2010) v. 10(2) p. 245-253 KEYWORDS: BROILER CHICKENS.

A feeding trial was conducted on the broiler to assess the effect of supplementation of vitamin D3 at four different Calcium:total phosphorus (Ca:tP) ratios of 1:1, 1.2:1, 1.4:1 and 2:1 in the wheat based diet supplemented with phytase on the growth performance. Eight diets containing phytase were prepared with and without vitamin D3 supplementation. Ca : tP ratio of the diets were obtained by varying the limestone powder and deoiled rice bran. The effects of supplementation of vitamin D3 at different Ca : tP ratios supplemented with phytase significantly ($P < 0.05$) affected body weight, weight gain (1–3 week) along with feed intake, Feed conversion ratio, Protein conversion ratio and Calorie conversion ratio during 4–5 and 1–5 weeks of age.

048. Panda, A.K.; 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). Reddy, M.R.; Project Directorate on Poultry, Hyderabad (India). Sunder, G. Shyam; Project Directorate on Poultry, Hyderabad (India). Response of Vanaraja Breeder (Male Line) Chicks to Dietary Concentrations of Lysine and Methionine. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 1-8 KEYWORDS: CHICKS. LAND RACES. WEIGHT GAIN. LYSINE. ESSENTIAL AMINO ACIDS. METHIONINE. NUTRIENTS.

The effect of dietary concentrations of lysine (Lys) and methionine (Met) on performance of Vanaraja breeder (male line) chicks was studied. Nine diets were formulated to contain 3 different concentrations of Lys (0.9, 1.0 and 1.1%) and Met (0.35, 0.40 and 0.45%) each in factorial manner. Each experimental diet was fed ad libitum to eight replicates of six chicks each during 0–6 weeks of age. Neither the concentrations of Lys and Met nor the interaction between them influenced body weight gain, feed conversion ratio; cell mediated immune response, activity of alkaline phosphatase in serum, gilet weight and weight of immune organs (spleen and bursa). However, levels of Lys in the diet significantly influenced serum concentrations of protein, activity of AST and ALT, and dressed weight. Higher concentration of protein and better dressed yield was observed in the diet containing 1.0% Lys. Dietary Met (0.4%) contents significantly influenced both feed consumption and humoral immune response (antibody titre to sheep RBC). No interaction effect was observed for any of the parameters studied except AST activity in serum and abdominal fat content of the carcass. It is concluded that Vanaraja breeder (male line) chicks require 1% lysine (Lys: $CP = 0.05$) and 0.4% methionine (Met: $CP = 0.02$) in diet for realizing optimum performance during 0 to 6 weeks of age.

049. Kulkarni, R.C.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Shrivastava, H.P.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Mandal, A.B.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Deo, C.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Deshpande, K.Y.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Singh, R.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Bhanja, S.K.; Central Avian Research Institute, Izatnagar (India). Division of Avian Nutrition and Feed Technology. Assessment of Growth Performance, Immune Response and Mineral Retention in Colour Broilers as Influenced by Dietary Iron. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 81-90 KEYWORDS: BROILER CHICKENS. NUTRIENTS. IRON. GROWTH RATE. IMMUNE RESPONSE.

An experiment was undertaken to evaluate the relative efficacy of chelated or organic ferrous aminoate (FeA) vis-a-vis inorganic ferrous sulphate (FeS) at each 120, 140 and 160 mg Fe/kg diet in broiler chickens. Six test diets, in factorial design (2 sources x 3 levels), and one control (Fe unsupplemented basal diet) were offered ad libitum to quadruplicate groups of 8 straight-run colour broiler chicks each, giving total number of 32 chicks per treatment, from 0–6 weeks of age split into starter (03 weeks) and finisher (3–6 weeks) phases. The response criteria included growth performance, immune response and mineral retention. The supplementation of FeS yielded significantly higher body weight gain (BWG) with improved feed conversion ratio (FCR) as compared to FeA. Among the levels, 120 mg/kg Fe accrued significantly higher BWG with improved FCR as compared to other levels. The immune response remained comparable due to different dietary sources or levels of Fe. Significantly higher bursal was seen at 120 and 140 mg Fe/kg diet from FeA than in control group. Carcass traits including relative weight of giblet remained comparable amongst dietary treatments. The Fe sources and levels did not affect retention of Ca, Cu and P, but had significantly better Fe retention in FeA fed groups than FeS. It was concluded that dietary supplementation of iron as organic ferrous aminoate yielded better immune status, while for better growth performance inorganic form as ferrous sulphate was superior. It is concluded that the mineral utilization was not affected due to the source of iron.

050. Garg, M.R.; National Dairy Development Board, Anand (India). Animal Nutrition Group. Bhandari, B.M.; National Dairy Development Board, Anand (India). Animal Nutrition Group. Gupta, S.K.; National Dairy Development Board, Anand (India). Animal Nutrition Group. A Study on Availability of Various Mineral Elements in Milch Buffaloes. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 91-102
KEYWORDS: WATER BUFFALOES. LACTATION. MINERAL CONTENT. TRACE ELEMENTS.

A study was carried out to assess dietary macro and micro-minerals status of milch buffaloes in Amritsar, Ludhiana and Patiala districts, under Central Plain Zone of Punjab. Feeds and fodder samples were collected at random from various locations. The average calcium (Ca) content in straws was low (0.28%). Green fodders such as berseem (1.82%), chikori (1.30%), mustard (1.59%) and rye grass (0.46%) were found to be rich source of Ca. Concentrate feed ingredients were particularly low (0.13%) in Ca, except for mustard cake (0.64%) in Ca. The phosphorus (P) content in crop residues and green fodders was 0.10 and 0.43 per cent, respectively. Concentrate feed ingredients were high (0.77%) in P. The sulphur (S) content was adequate in green fodder (0.31%), whereas, crop residues (0.18%) and concentrate ingredients (0.17%) were deficient. The average copper (Cu) content was low in straws (4.46 ppm) and moderate in green fodders (13.38 ppm) and concentrate feed ingredients (10 ppm). The cobalt (Co) was deficient in the diet of animals to the extent of 26 per cent; however, iron (average level 597 ppm) and manganese (average level 63 ppm) in most of the feed ingredients were adequate, with the prevailing feeding practices. Zinc (Zn) was deficient in most of the feedstuffs (average level 44 ppm). From the present study, it was apparent that the levels of certain minerals such as Ca, P, S, Zn, Cu and Co were inadequate, as per the prevailing feeding practices and requirement of buffalo yielding daily 10 kg milk (6% fat) in the Central Plain Zone of Punjab.

051. Dhuria, R.K.; Rajasthan Agricultural University, Bikaner (India). College of Veterinary and Animal Science. Sharma, T.; Rajasthan Agricultural University, Bikaner (India). College of Veterinary and Animal Science. Purohit, G.R.; Rajasthan Agricultural University, Bikaner (India). College of Veterinary and Animal Science. Effect of Densification of Gram Straw Based Complete Feed on Rumen and Haemato Biochemical Parameters in Magra Lambs. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 133-140
KEYWORDS: LAMBS. COMPLETE FEEDS. STRAW. RUMEN DIGESTION.

Eight Magra lambs (4–5 m of age and 13.41±0.74 kg BW) were randomly divided into two equal groups and offered complete feed for 120 days containing gram straw (*Cicer arietinum*) and concentrate mixture in 60:40 ratio in loose and densified form as complete feed block prepared at 4000 psi. Rumen parameters viz., pH, total volatile fatty acids, rumen ammonia nitrogen and total protozoal count were estimated at 0 (before feeding), 3 and 6 h post feeding. Haemato biochemical constituents were also analysed during 120 days of feeding at fortnightly intervals to adjudge the physiological status of the animals. There was no significant difference in

pH, total volatile fatty acids and total protozoal count values among loose and densified form of complete feed fed groups. However, the time of sampling post feeding had significant effect on all the parameters. The rumen ammonia nitrogen concentration was significantly ($P<0.01$) higher in lambs fed complete feed in loose form than block fed group. Regarding haemato biochemical parameters of blood, all the parameters viz., haemoglobin, packed cell volume, blood glucose and total serum protein were well within the normal range and there was no significant difference among the loose and block form of complete feed. It is concluded that densification of gram straw based complete feed had no adverse effect on rumen and haemato biochemical parameters in Magra lambs and complete feed blocks are as efficiently utilized as loose form of feed.

052. Hadiya, K. K.; College of Veterinary & Animal Sciences Anand (India). Ravikanth, K.; Ayurvet Limited, Baddi (India). Maini, S.; Ayurvet Limited, Baddi (India). Thakur, D.; Ayurvet Limited, Baddi (India). Effect of Herbal Liver Tonic Yakrifit Bolus on Body Weight Gain in Dairy Calves. *Veterinary World* (India). (Oct 2010) v. 3(10) p. 469-470 KEYWORDS: CALVES. STIMULANTS. GROWTH RATE. LIVER. ANABOLISM.

An experimental field study in approximately, one month old, forty eight Jaffrabadi buffalo calves was conducted to evaluate the efficacy of herbal Liver tonic formulations on growth and body weight gain. A significant ($P<0.05$) increase in body weight gain in groups supplemented with herbal formulations Yakrifit (M/s Ayurvet Ltd. Baddi, India) 1 bolus/calf/day, was observed in comparison to untreated control. Supplementation of herbal liver tonic products improves liver function, feed assimilation and digestibility of ration ultimately leading to gain in body weight.

L10 Animal Genetics and Breeding

053. Kumar, Suresh; ICAR Research Complex for NEH Region, Gangtok (India). Chandra, Ramesh; ICAR Research Complex for NEH Region, Gangtok (India). Haque, Nazrul; ICAR Research Complex for NEH Region, Gangtok (India). Toppo, Saroj; ICAR Research Complex for NEH Region, Gangtok (India). Rahman, H.; ICAR Research Complex for NEH Region, Gangtok (India). Effect of GnRH and PGF2a on uterine involution and post-partum fertility in crossbred cows. *Indian Journal of Animal Sciences* (India). (Dec 2010) v. 80(12) p. 1175–78 KEYWORDS: FERTILITY. PERINATAL PERIOD. UTERUS.

The present experiment was conducted in recently parturited crossbred cows to study the effect of GnRH and prostaglandin administration on uterine involution and resumption of ovarian cyclicity. The animals in group 1 (n=9) were administered GnRH (buserlin acetate, 20 ig, I/M) on day-16 post-partum, followed by PGF2a (tiaprost 725 ig) on day 24 post-partum and second group animals (n=6) were administered same amount of NSS as placebo. The animals in group 1 showed significant improvement in uterine involution (33.3 ± 2.66 vs 42.66 ± 5.89 days) and resumption of post-partum cyclicity (36.22 ± 5.89 vs 57.16 ± 8.36 days) as compared to control. Hence it can be concluded from the present study that administration of GnRH-PGF2a in early post-partum period hastens the uterine involution and improves the reproductive efficiency of crossbred cows.

054. Haile, Aynalem; National Dairy Research Institute, Karnal (India). Joshi, B.K.; National Dairy Research Institute, Karnal (India). Ayalew, Workneh; National Dairy Research Institute, Karnal (India). Tegegne, Azage; National Dairy Research Institute, Karnal (India). Singh, Avtar; National Dairy Research Institute, Karnal (India). Chakravarty, A.K.; National Dairy Research Institute, Karnal (India). Comparison of sire evaluation methods in Holstein Friesian in the central highlands of Ethiopia. *Indian Journal of Animal Sciences* (India). (Dec 2010) v. 80(12) p. 1194–97 KEYWORDS: BREEDING VALUE. ETHIOPIA. SIRE EVALUATION. METHODS.

First lactation records (387) of Friesian-Boran crossbred cows, daughters of 37 Holstein Friesian (HF) sires were analyzed. Holstein Friesian sires were evaluated based on breeding values estimated considering first lactation 305- days milk yield of their progeny using 4 sire evaluation methods, viz. contemporary comparison (CC), least squares method (LS), best linear unbiased prediction (BLUP) and derivative free restricted

maximum likelihood (DFREML). The effectiveness of the methods was judged using various criteria, viz. error variance, coefficient of determination, coefficient of variation and rank correlation. The highest (1781.1 kg) and lowest (1766.78 kg) average breeding values were obtained by CC and DFREML methods, respectively. DFREML had the smallest (197061 kg²) error variance and highest (60%) R² value and was adjudged as the most efficient and accurate method compared with others. The CV values computed by different methods were similar indicating lack of meaningful variation amongst the methods as far as stability is concerned. The rank correlations between the ranks of HF sires evaluated by different methods were high (greater than 0.93), indicating that ranking of sires using any of these methods could yield similar order. The implication of the result is that, based on availability and computational suitability of the method, one can use any of the methods in sire evaluation under the Ethiopian condition.

055. Kumar, Amit; National Dairy Research Institute, Karnal (India). Gandhi, R.S.; National Dairy Research Institute, Karnal (India). Comparison of sire evaluation methods for first lactation milk yield and lifetime traits in Sahiwal cattle. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1198–1202 KEYWORDS: MILK YIELD. SIRE EVALUATION.

The least squares method (LSM), best linear unbiased prediction (BLUP) and animal model of derivative free restricted maximum likelihood (DFREML) were used to estimate breeding values (EBVs) of Sahiwal sires by analyzing first lactation and lifetime records of their daughters maintained at 3 different farms. The highest overall average breeding value (1581.80 kg) for first lactation 305 days milk yield (FL305DMY) was obtained by BLUP method and the lowest breeding value (1522.53 kg) was obtained by least squares method. The average breeding value of Sahiwal sires for stayability were 2164.18, 1510.02 and 1927.45 days, respectively, using LSM, BLUP and DFREML methods of sire evaluation, whereas the average breeding value for lifetime milk yield (LTMY) were 9432.79, 6054.39 and 7437.27 kg, respectively, using 3 methods of sire evaluation. The derivative free restricted maximum likelihood (DFREML) method had the minimum error variance (16031.49 kg²) and was adjudged as the most efficient method of sire evaluation on the basis of FL305DMY. On the other hand, the least squares method (LSM) of sire evaluation had minimum error variances (5497332.00 kg² and 181327.00 days²) for lifetime milk yield and stayability, and was found to be most efficient over other 2 methods of sire evaluation. The lowest range of breeding values for FL305DMY and stayability using sire model (BLUP) indicated that this method was least capable to discriminate amongst bulls to the highest extent in comparison to LSM and DFREML. Also the least squares method had highest R² value hence most accurate for evaluating sires on the basis of lifetime traits. The daughters of sires selected for higher FL305DMY would tend to produce higher LTMY up to reasonable extent. However sires selected for higher breeding value for first lactation milk yield may not produce daughters with longer herd life.

056. Mishra, Priyanka; National Bureau of Animal Genetic Resources, Karnal (India). Verma, N.K.; National Bureau of Animal Genetic Resources, Karnal (India). Aggarwal, R.A.K.; National Bureau of Animal Genetic Resources, Karnal (India). Dixita, S.P.; National Bureau of Animal Genetic Resources, Karnal (India). Breed characteristics and genetic variability in Changthangi goats. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1203–09 KEYWORDS: BREEDS (ANIMALS). GENETIC VARIATION. GOATS.

Changthangi, a Pashmina yielding goat breed of India, is found at high altitudes ranging from 3000 to 6000m above mean sea level in the trans Himalayan mountain range bordering Tibet. It is more localized in Changthang sub division of Ladakh region of Jammu and Kashmir. The study was done to know the genetic variability within breed. Genomic DNA isolated from randomly collected blood samples was amplified using standard PCR conditions before analyzing on an automatic DNA sequencer. A battery of 12 microsatellite markers was used for genetic characterization. The data thus generated were analysed to estimate the allele frequencies, allele number, heterozygosity, poly information content and inbreeding coefficient. The observed number of alleles varied from 5 (OarJMP 29) to 19 (Oar FCB304) with a mean of 10.4 ± 3.91 . The effective number of alleles varied from 1.56 (OarJMP29) to 8.92 (OarFCB304) with a mean 4.59 ± 2.07 . The value of Shannon information index (I) ranges from 0.774 (OarJMP29) to 2.487(OarFCB304) whereas poly information

contents range from 0.343 (OarJMP29) to 0.846 (OarFCB304). The high value of I and PIC indicated the suitability of markers for studying the genetic variability in goat species. Observed heterozygosity ranged from 0.2368 (OarJMP29) to 0.9783 (OarFCB304). The mean observed heterozygosity was 0.3979. The expected heterozygosity was highest (0.8880) for locus Oarfeb 304 and lowest (0.3618) for locus OarJMP29. Nine of the 12 loci showed the positive inbreeding coefficient. Among the positive values the Fis varied from 0.0527 (ILSTS008) to 0.6491 (OMHC1) with a mean of 0.1773 however, ILST044, ILSTS002, OarFCB304 exhibited the negative values corresponding to 0.0471, 0.0855 and 0.1016 respectively. The L shaped curve obtained indicated that Changthangi population has not undergone any recent bottleneck. The study indicated that Changthangi goats exhibited substantial amount of genetic variation as reflected from the heterozygosity and number of alleles per locus. Avoiding unplanned and indiscriminate mating between individuals can increase the heterozygosity which can be exploited in the improvement of productivity of this breed.

057. Mandal, Ajoy; Central Institute for Research on Goats, Mathura (India). Rout, P.K.; Central Institute for Research on Goats, Mathura (India). Roya, R.; Central Institute for Research on Goats, Mathura (India). Estimates of genetic parameters for birth weight of Jakhrana goat. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1209–12 KEYWORDS: ANIMAL MODELS. BIRTH WEIGHT. GENETIC PARAMETERS. GOATS. MOTHERS.

Estimates of co (variance) components and genetic parameters were obtained for birth weight in Jakhrana goat maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, India, over a period of 5 years (2005 to 2009). Records of 498 kids from 140 does sired by 29 bucks were used in the study. Analyses were carried out by REML fitting an animal model and ignoring or including maternal genetic or permanent environmental effects. Four different animal models were fitted for birth weight. Direct heritability estimates were inflated substantially for the trait when maternal effects were ignored. Direct heritability estimates for birth weight ranged from 0.40 to 0.61 depended on models used. Maternal heritability for this trait was 0.10, whereas, the estimates of the fraction of variance due to maternal permanent environmental effects was 0.11. Results suggest that the maternal effects (i.e. both maternal additive and/or permanent environmental maternal effect) were also important for birth weight. These results indicate that there is ample scope of genetic progress through selection for this trait.

058. Nagpal, A.K.; National Research Centre on Camel, Bikaner (India). Performance of breeding male camels fed sole dry moth fodder vis-à-vis complete feed blocks. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1226–29 KEYWORDS: BREEDING METHODS. PERFORMING ANIMALS. COMPLETE FEEDS. MINERALS. CAMELS. NUTRITION PHYSIOLOGY.

The study was conducted to assess the variations in body weight, feed and water intake over a period of 5 months and adequacy of energy, protein and macro-minerals in breeding male camels fed dry moth fodder and complete feed blocks. Eight Jaisalmeri breeding male camels (5–9 years old; 681.13 ± 20.13 kg BW) were randomly divided into 2 groups of 4 each and were fed dry moth fodder (T₁) and complete feed blocks (T₂) consisting of dry chaffed guar straw (65.25%), dry chaffed groundnut fodder (20%), molasses (4%), guar churi (6%), wheat bran (4%), mineral mixture (0.25%) and common salt (0.50%) for 147 days. The camels of both the groups showed decrease in body weights and feed intake/100 kg body weight till 3 months after which improvement was observed. The body weight loss was nonsignificantly higher in T₁ (7%) than in T₂ (3%). During digestibility trial, the daily DMI kg or DMI kg/100 kg BW were observed to be 4.6, 7.86 or 0.73, 1.08 in T₁ and T₂ respectively. Significantly higher digestibility coefficients of OM, CP and EE were observed in T₂ than in T₁ camels. Because of higher daily DMI and digestibility coefficients, the intake of DCP and TDN was 206.07 and 85.06% higher in T₂ group than T₁ group, former being significant. The mineral absorption of Na, K, P was significantly lower in T₁ camels while reverse was true for Mg. The study inferred that feeding of complete feed blocks was better for camels in terms of body weight maintenance, energy, protein and minerals utilization.

059. Bombatkar, R.S.; Maharashtra Animal and Fishery Sciences University, Akola (India). Pawshe, C.H.; Maharashtra Animal and Fishery Sciences University, Akola (India). Chauhan, M.S.; Maharashtra Animal and Fishery Sciences University, Akola (India). Raut, P.B.; Maharashtra Animal and Fishery Sciences University, Akola (India). Immature buffalo (*Bubalus bubalis*) oocytes vitrification: Effect of ethylene glycol concentrations on survivability and nuclear maturation. *Indian Journal of Animal Sciences (India)*. (Jul 2010) v. 80(7) p. 629-633 KEYWORDS: WATER BUFFALOES. OVA. SEMEN PRESERVATION. IN VITRO FERTILIZATION. PRESERVATION. CRYOPROTECTANTS. IN VITRO.

The objective of the present research work was to study the effect of 5, 6 and 7 M ethylene glycol (EG) concentrations during vitrification of immature buffalo oocytes. The COCs were retrieved by aspirating visible follicles on the ovaries collected from slaughterhouse and loaded into 0.25 ml French straws after exposing to the equilibration medium (50% VS v/v in DPBS) for 1 min and the final vitrification solutions of respective concentrations of EG. The straws were then directly plunged into the LN2. After thawing in warm water (28–30°C), for equilibration COCs were kept for 4 step dilutions step-wise in 0.5, 0.33, 0.17 and 0.00 M sucrose holding medium for 5 min each. The percent morphologically normal oocytes recovered were significantly higher (75.00%) in 7 M concentration. For nuclear maturation, the COCs were placed in 50 μ l droplets of maturation medium and cultured for 24 h in CO₂ incubator at 39°C temperature. The proportion of maturation reached to metaphase-II was significantly higher in 7 M (47.42%) concentration whereas the highest nuclear degeneration was in 6 M (70.47%) concentration. From the results, it was revealed that 7 M concentration has beneficial effect on survivability and nuclear maturation of oocytes.

060. Sharma, Rakesh; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Parmar, S.N.S.; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Joshi, C.G.; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Thakur, M.S.; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Bhong, C.D.; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Chaudari, M. V .; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (India). Molecular characterization of Nimari cattle using fluorescently labeled microsatellite markers. *Indian Journal of Animal Sciences (India)*. (Jul 2010) v. 80(7) p. 661-665 KEYWORDS: CATTLE. LAND RACES. GENES. GENETIC MARKERS. MICROSATELLITES.

Molecular characterization of Nimari cattle was done for genetic variability study, using fluorescently labeled microsatellite markers as per the recommendation of the FAO and NBAGR, Karnal. Nimari cattle are an important drought-purpose breed of India, which needs urgent conservation due to its declining population in its breeding tract. Number of alleles, allelic frequency, heterozygosity, Hardy-Weinberg equilibrium and polymorphism information content (PIC) revealed higher genetic variability and polymorphism within breed. A total of 206 alleles were observed out of 24 microsatellite markers analyzed with mean of 8.58. Bottleneck analysis revealed no genetic bottleneck in Nimari population.

061. Chakraborty, D.; CCS Haryana Agricultural University, Hisar (India). Dhaka, S.S.; CCS Haryana Agricultural University, Hisar (India). Pander, B.L.; CCS Haryana Agricultural University, Hisar (India). Yadav, A.S.; CCS Haryana Agricultural University, Hisar (India). Dandapat, A.; CCS Haryana Agricultural University, Hisar (India). Genetic studies on 305 days and test day milk yield records in Murrah buffaloes. *Indian Journal of Animal Sciences (India)*. (Aug 2010) v. 80(8) p. 729-732 KEYWORDS: WATER BUFFALOES. GENETIC CORRELATION. GENETIC COVARIANCE. MILK YIELD. MILK PERFORMANCE. MILK. MILK RECORDING. HERITABILITY.

Data pertaining to first lactation records on 326 Murrah buffaloes, progeny of 48 bulls calved during 1987 to 2006, maintained at Buffalo Research Centre, Chaudhary Charan Singh Haryana Agricultural University, Hisar, were analyzed. The overall population means were 1 818.06 kg, 4.43 kg, 7.90 kg, 8.11 kg, 7.82 kg, 7.81 kg, 7.25 kg, 6.64 kg, 6.07 kg, 5.37 kg and 5.13 kg for 305 days milk yield and first 10 test day records TD1, TD2, TD3, TD4, TD5, TD6, TD7, TD8, TD9 and TD10, respectively. Period of calving had significant effect on TD1, TD7 and TD9. However, season of calving had nonsignificant effect on all the traits under this study except for 305 days milk yield. The estimates of heritability of various traits were not significantly different

from zero as standard errors of estimates were higher. The genetic correlations for all traits were moderate to high except for TD2 with TD7 and TD9, where low estimates were obtained. The phenotypic correlations were moderate to high and in some cases negative.

062. Mishra, A.; Indian Veterinary Research Institute, Izatnagar (India). Vikash Chandra; Indian Veterinary Research Institute, Izatnagar (India). Sharma, G.T.; Indian Veterinary Research Institute, Izatnagar (India). Effect of epidermal growth factor on in-vitro maturation of buffalo oocytes and subsequent development with insulin-like growth factor-1 and β -mercaptoethanol. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 721-724 KEYWORDS: WATER BUFFALOES. FERTILIZATION. IN VITRO. OVA.

This study was conducted to find out the effect of epidermal growth factor (EGF) on in-vitro maturation of buffalo oocytes and their subsequent embryonic development with insulin like growth factor-1 (IGF-1) and β -mercapto ethanol (β -ME). Cumulus oocyte complexes (COCs) were matured in the TCM- 199 supplemented with EGF (20 ng/ml) or no EGF and fertilized in vitro followed by their culture in 4 different media as group 1 (matured without EGF and cultured without IGF- 1 and β -ME), group 2 (matured with EGF and cultured without IGF-1 and β -ME), group 3 (matured with EGF and cultured with IGF-1 (100 ng/ml) but no β -ME) and group 4 (matured with EGF and cultured with IGF-1(100 ng/ml) and β -ME (100 μ M). Results of this study showed that EGF increases maturation percentage significantly ($P < 0.01$) in comparison to the control group where EGF was not used. There was a non-significant increase in number of cleavage, morula and blastocyst in all the groups as compared to group 1. Group 1 showed significantly ($P < 0.05$) lower cleavage, morula and blastocyst number as compared to other groups is an indication that these growth factors (EGF and IGF-1) and β -ME have positive effect on development of embryos.

063. Nischal; Central Avian Research Institute, Izatnagar (India). Singh, K.B.; Central Avian Research Institute, Izatnagar (India). Singh, B.P.; Central Avian Research Institute, Izatnagar (India). Singh, U.B.; Central Avian Research Institute, Izatnagar (India). Sharma, D.; Central Avian Research Institute, Izatnagar (India). Evaluation of a short-term selection study in specialized naked neck populations. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 809-812 KEYWORDS: BROILER CHICKENS. SELECTION. SELECTION RESPONSES. GENETIC PARAMETERS.

Two naked neck populations, Naked neck White plumage (NNWP), under selection for fifth week body weight (5 wk BW) and Naked neck Coloured plumage (NNCP) under selection for 5 wk BW as well as number of eggs laid up to 40th weeks of age (40 EN) along with a pedigreed random mating control population were evaluated. The effective population size was large ($N_e = 103$), and very marginal increase of 0.0037 in rate of inbreeding was observed over generations. Moderately high estimates of heritability for 5 wk BW (0.31 to 0.26) over generations were estimated in both the selected populations. High positive genetic and phenotypic correlations between third week body weight (3 wk BW) and 5 wk BW were found in both the selected populations over generations. Highly significant phenotypic (98.60–100.90 g) and genetic (50.10–58.40 g) correlation were realized for fifth wk BW. In NNCP, the realized gains were significant for 40 EN. Correlated gains were significant and positive for 3 wk BW in both the selected populations; however, the genetic gains in weight gain (3–5 wk) were significant only in NNWP. Feed consumption (3–5 wk) showed significant increase at genetic level in both the populations, but the feed efficiency showed non-significant genetic gains. Genetic gains were nonsignificant gains in carcass traits in both the populations. The time trend over generations was non-significant for all the traits in control population.

064. Rao, M.M.; Srivenkateswara Veterinary University, Guntur (India). Umamahesh, Y.; Srivenkateswara Veterinary University, Guntur (India). Misra, A.K.; Srivenkateswara Veterinary University, Guntur (India). Evaluation of ovarian response and embryo production pattern in Ongole cows. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 973-975 KEYWORDS: ZEBU. EMBRYO TRANSFER. OVULATION. SUPEROVULATION.

The present study was undertaken to evaluate the relative distribution of ovarian response and embryo recovery in a large scale embryo transfer programme in Ongole (*Bos indicus*) cows. Parous Ongole cows (58) were subjected to super ovulatory treatment by administering 200 mg NIH-FSH-p1 in a twice daily descending dose schedule for 4 days and induction of luteolysis at 48 and 60 h after initiating treatment. Non-surgical embryo collection was performed on day 7 after superestrus; 94.83% cows responded to superovulation with a mean of 13.53 ± 0.79 ovulations. The mean total ova/embryo recovery was 10.09 ± 0.93 of which 72.79% were transferable. Grade 1 embryos (73.02%) and compact morula (72.78%) were the predominant category in this study.

065. Ajesh Kumar; Rajasthan Agriculture University, Udaipur (India). Tailor, S.P.; Rajasthan Agriculture University, Udaipur (India). Genetic studies of production efficiency traits and their uses in sire evaluation. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 989-992 KEYWORDS: SIRE EVALUATION. FATHERS. BREEDING METHODS. GENETIC INHERITANCE.

The information with respect to first lactation production and reproduction traits for each buffalo maintained at Network Project on Buffaloes, Livestock Research Station, Vallabhnagar from 1976 to 2004 were used for the present study. The MY/FLL and MY/FCI was significantly affected by sire, MY/FCI by period of calving and MY/FCI, MY/ASC and MY/AFCON by season of calving. The heritability estimates for MY/FLL and MY/FCI were 0.343 ± 0.145 and 0.199 ± 0.125 , respectively. Heritability estimates for MY/ASC and MY/AFCON were low. The genetic association of AFC with MY/FCI, MY/ASC and MY/AFCON was positive and high. The phenotypic correlation of AFC with MY/ASC and MY/AFCON was negative and significant. The genetic association of FSP and FCI with MY/FLL and MY/ASC was positive and low to moderate while with MY/FCI and MY/AFCON were negative and low to moderate. The phenotypic association of FSP and FCI with MY/FCI, MY/ASC and MY/AFCON was negative and significant. The genetic and phenotypic correlation coefficients among production (FLMY, 305 MY and FPY) and production efficiency traits (MY/FLL, MY/FCI, MY/ASC and MY/AFCON) were positive and moderate to high. Among production efficiency traits maximum sires (47.83%) showed above average breeding value estimated by MY/FCI. The range as percentage of average breeding value was the maximum for breeding value estimated by MY/ASC at 85.19%. Among the multi traits 46.37% sires showed breeding value more than average breeding value estimated by IVSII. The breeding value estimated by IVSII also showed maximum (228.09%) range as percentage of average breeding value among all the traits under study. The rank correlation coefficients between single and multi traits were positive, high and significant. Considering the computational facilities required for construction of selection index, selection of sire can be made on the basis of MY/ASC with good reliability when selection index is not available.

L40 Animal Structure

066. Pawan Kumar; CCS Haryana Agricultural University, Hisar (India). Singh, G.; CCS Haryana Agricultural University, Hisar (India). Nagpal, S.K.; CCS Haryana Agricultural University, Hisar (India). Histological studies on the paraepiglottic tonsil of the sheep. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 650-652 KEYWORDS: SHEEP. LYMPHATIC DISEASES. TONSILS.

The paraepiglottic tonsil studied in 6 young sheep revealed stratified squamous non-keratinised epithelium having strata basale, spinosum and superficiale which modified into reticular epithelium due to heavy infiltrates of underneath lymphoid tissue. The loose irregular connective tissue of lamina propria submucosa was mainly constituted by lymphoid and glandular tissue. The lymphoid tissue organized in the form of isolated scattered aggregations and the follicles was constituted by lymphocytes, plasma cells and macrophages. The interfollicular areas were rich in lymphocytes, blood capillaries, macrophages and high endothelial venules. The mucous acini showed a strong PAS positive reaction for glycogen, acidic mucopolysaccharides and Alcianophilic mucopolysaccharides. The neutral mucopolysaccharides were localized in smaller concentration only towards the periphery of a few acini. However these reactions were absent in the glandular ducts. In

addition, large venous caverns like structures filled with blood, large nerve bundles and fatty tissue were also present.

067. Kalita, P.C.; Central Agricultural University, Aizawal (India). Singh, G.K.; Central Agricultural University, Aizawal (India). Histology and histochemistry of the small intestine of the post-hatch Kadaknath fowl. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 656-660 KEYWORDS: POULTRY. ANIMAL MORPHOLOGY. HISTOPATHOLOGY. INTESTINES.

The mucosa of entire small intestine of Kadaknath fowl showed villi of variable shapes and sizes according to the age. The surface of the villi and crypts of the various segments were lined with simple columnar epithelium comprising chief or main epithelial cells, the goblet cells and the argentaffin cells. The epithelial cells of the glands were smaller than those of the villi. The goblet cells were observed nearer the tip of the villus as the age of the bird increased. The Brunners glands were lacking. Argentaffin cells were found in small numbers at the bases of the crypts and rather infrequently on the villi. The connective tissue of the lamina propria had very few large collagen fibres but possessed a network of fine reticular fibres which were associated with the reticular networks of the blood vessels and muscle fibres. The tracts of smooth muscle fibers were well developed and together with the blood and lymph vessels, comprised a large proportion of corium of villus. The submucosa was so poorly developed as to be almost nonexistent in most part of the small intestine. Among various segments a high density of collagen was seen in duodenum and ileum especially in the serosa layer, interglandular connective tissue and intermuscular connective tissue. The collagen fibres were scanty in day-old and 7-day-old bird whereas in 28, 56 and 112-old bird there was greater intensity of these fibres. Elastic fibres were not found in the corium of young birds, whereas thick branching and anastomosing elastic fibres were associated with the coats of the large blood vessels in the serosa layer. The PAS and Alcian Blue staining reaction revealed strongly sulphated epithelial mucins and neutral mucins respectively with mild to strong intensity from one day to 112 days old Kadaknath fowl.

068. Singh, R.; Indian Veterinary Research Institute, Izatnagar (India). Singh, K.P.; Indian Veterinary Research Institute, Izatnagar (India). Sharma, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Nandi, A.K.S.; Indian Veterinary Research Institute, Izatnagar (India). Chauhan, R.S.; Indian Veterinary Research Institute, Izatnagar (India). Mortality due to infectious canine hepatitis in sloth bears (*Melursus ursinus*) in captivity. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 961-964 KEYWORDS: URSIDAE. MORTALITY. CAPTIVITY. HISTOPATHOLOGY.

Sloth bears (3 males and 2 female) of a rescue facility in Agra district of Uttar Pradesh, which died acutely due to emaciation, anorexia, non-specific nervous signs, and widely spread petechial hemorrhages/congestion on serosal surfaces, were subjected to histopathological examination. The clinical blood picture in one of the cases showed leucocytosis ($15.9 \sim 103/f\hat{E}l$) associated with marked absolute neutrophilia. The hemoglobin (15.4 g/dl), packed cell volume (43.4%), ESR (5 mm/h) and the platelet counts ($290 \sim 103/f\hat{E}l$) were within the normal range. The derived MCV (64 FL), MCH (22.7 pg), and MCHC (35.5 g/dl) values were not much changed. Serum ALT and AST were significantly high: 136 U/L and 1159 U/L, respectively, reflecting hepatic injury, however, total bilirubin in serum remained unaffected. In addition, total protein (3.9 g/dl: albumin 1.94 g/dl, globulin 1.96 g/dl) and alkaline phosphates (306 U/L) values deviated from the reference range showing damages to the liver and other body organs. The urea and creatinine levels were high, 79 mg/dl and 1.7 mg/dl, respectively, indicating renal damage. The histopathological changes in different organs showed necrosis of parenchymatous organs together with edema and hemorrhages, presence of intranuclear inclusions of Cowdry type A in hepatocytes, renal tubules, lymphoid tissues, and in wide spread vascular endothelial cells of the organs, including brain. The inclusions were sparingly few in liver, lung, stomach and intestine compared with spleen, brain and kidneys, where these were in abundance. In pancreas, these were almost not traceable. Interestingly, the intertubular vascular endothelial cells had plenty of inclusions.

L50 Animal Physiology and Biochemistry

069. Rafeeqi, Towseef Amin; National Dairy Research Institute, Karnal (India). Kaul, Gautam; National Dairy Research Institute, Karnal (India). A unique and promising scaffolding structure for animal cell culture: Carbon nanotubes. *Indian Journal of Animal Sciences (India)*. (Dec 2010) v. 80(12) p. 1187–93 KEYWORDS: ANIMAL CUTICLE. CELLS. CARBON. TISSUE ANALYSIS. ENGINEERING.

Recently the development of carbon nanotubes (CNTs) as a scaffold in animal cell culture has attracted a great deal of attention. The CNTs, which are macromolecular form of carbon of nanoscale dimensions, are viewed as a class of material with high potential for biological applications due to their unique mechanical, physical and chemical properties. CNTs may serve as an important component in imparting novel properties to the biomatrix necessary for cell growth and may provide the initial structural reinforcement needed for newly created tissue scaffolds. Supporting the use of CNTs as scaffold in tissue engineering many cell types like neuronal cells, fibroblasts and bone cells have been successfully grown on it. CNTs have also been used as in tracking of implanted cells, cancer therapy, and biological sensors and as a bioactive delivery agent for DNA and drugs into the cells. Although significant promise has been shown by CNTs in emerging bio-technology, however the potential exposure of CNTs to environment and human has also shown great concern about their toxicological hazard and consequently more investigations are necessarily required.

070. Thakur, S.S.; National Dairy Research Institute, Karnal (India). Verma, M.P.; National Dairy Research Institute, Karnal (India). Ali, Babar; National Dairy Research Institute, Karnal (India). Shelke, S.K.; National Dairy Research Institute, Karnal (India). Tomar, S.K.; National Dairy Research Institute, Karnal (India). Effect of exogenous fibrolytic enzymes supplementation on growth and nutrient utilization in Murrah buffalo calves. *Indian Journal of Animal Sciences (India)*. (Dec 2010) v. 80(12) p. 1217–19 KEYWORDS: WATER BUFFALOES. CALVES. ENZYMES. GROWTH. NUTRITION PHYSIOLOGY.

The present experiment was conducted to study the effect of supplementing exogenous fibrolytic enzymes (cellulase 4050 iM glucose/g/h and xylanase 8600 iM xylose/g/min mixed equally w/w) at 2 levels 1.5 and 3.0 g mixture/kg DM of TMR on the growth performance and nutrient utilization in buffalo calves. Female Murrah buffalo calves (18) were randomly divided into 3 groups (8–10 month of age; 149.44, 151.08 and 151.62 kg BW; 6 each) and fed concentrate, wheat straw and green maize fodder in 40: 45:15 proportions (DM basis) in control group and the same ration as fed to control group plus 1.5 g enzyme mixture/kg DM of TMR (group 1) and 3.0 g enzyme mixture/kg DM (group 2) for 120 days. Average body weight gain in group 1 was 96.10 kg, which was higher than group 2 (83.20 kg) and control group (83.08 kg). Average daily gain was also higher in group 1 (800.79 g/d) over the group 2 (693.33 g/d) and control group (692.35 g/d). DMI was higher in group 1 (4.37 kg/d) as compared to control (4.24 kg/d) and group 2 (4.24 kg/d). The digestibility coefficient of NDF, cellulose and hemicellulose were higher in group 1 over the group 2 and control group. It could be concluded that supplementation of exogenous fibrolytic enzymes 1.5 g mixture/kg DM improved the growth rate in Murrah buffalo calves.

071. Mohanta, Ranjan K.; National Dairy Research Institute, Karnal (India). Singhal, K.K.; National Dairy Research Institute, Karnal (India). Tyagi, A.K.; National Dairy Research Institute, Karnal (India). Rajput, Y.S.; National Dairy Research Institute, Karnal (India). Effect of feeding transgenic cottonseed (Bt-cry1Ac gene) on nutrient utilization, production performance and blood biochemical status in lactating dairy cows. *Indian Journal of Animal Sciences (India)*. (Dec 2010) v. 80(12) p. 1220–25 KEYWORDS: BIOSAFETY. DIGESTIBILITY. FEED INTAKE. TRANSGENICS. COTTONSEED.

The study was made to compare the effect of transgenic (Bt, Cry1Ac) linted whole cottonseed (WCS) on nutrient intake and utilization, milk production and biosafety with that of isogenic (on Bt) WCS. Lactating multiparous cows (16) adapted to non Bt cottonseed based concentrate mixture (40%) were divided randomly in 2 groups of 8 each. Non- Bt group (control) continued on same ration while in Bt group, non-Bt WCS in concentrate mixture was replaced with Bt WCS in a feeding trial of 4 weeks. BW gain, nutrient intake and digestibility, milk yield and composition, body condition score, and blood parameters did not vary significantly

between the groups. Non detection of Bt protein (Cry1Ac) in milk or blood plasma indicated the degradation of the protein in the gastrointestinal tract of cows. It was concluded that Bt (Cry1Ac) cottonseed is as safe and nutritious as conventional cottonseed, when fed to lactating crossbred cows for 4 weeks.

072. Kumari, M.; Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Wadhwa, D.; Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Sharma, V. K.; Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Sharma, K.S.; Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Katoch, B.S.; Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (India). Dietary effect of combination of some probiotic microorganisms on productive performance of layer chickens fed up to the starter phase. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1230–34 KEYWORDS: NUTRITIVE VALUE. NUTRIENTS. PROBIOTICS.

Comparative biological response of combination of different strains of lactobacilli, streptococci and yeast, isolated from different indigenous sources was studied in commercial laying chickens. The treatments consisted of T₁ (control feed with culture medium only), T₂ (*Lactobacillus bulgaricus* L₄ + *Streptococcus lactis* S₁ + *Saccharomyces cerevisiae* Y₃), T₃ (*L. acidophilus* leopard excreta + *S. faecalis* leopard excreta + *Torulopsis spherica* calf dung), T₄ (*L. acidophilus* bottle gourd + *S. uberis* bitter gourd + *S. cerevisiae* bitter gourd), T₅ (*L. lactis* tomato + *S. faecium* khamir + *Pichia memberanaefaciens* tomato), T₆ (T₂ + T₃) and T₇ (T₃ +T₄). In overall, the FCR was higher in probiotic fed groups as compared to that of the control. Mortality was observed in the control (T₁) and T₅ group only. Feed consumed per kg egg mass was lower and, percent hen per day egg production was higher in all the probiotic fed groups. The probiotic feeding resulted in larger egg size production. The better egg laying performance could be due to the higher total and % Gram +ve microbial counts in the intestinal tract. It could be concluded that the probiotics, fed only up to 8 weeks of age showed a carry-over effect on the laying performance throughout the laying period and there was no need to mix too many strains of microbes from different sources to increase the farm returns.

073. Sar, T.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Mandal, T.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Samanta, I.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Rahaman, A.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Chakraborty, A.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Determination of ceftriaxone in plasma and ceftizoxime in milk of mastitic cows following single dose intravenous administration. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1182–84 KEYWORDS: STAPHYLOCOCCUS. MASTITIS. ENZYMES.

074. Dass R.S.; Indian Veterinary Research Institute, Izatnagar (India). Mendiratta, S.K.; Indian Veterinary Research Institute, Izatnagar (India). Bhadane K.P.; Indian Veterinary Research Institute, Izatnagar (India). Mudgal, Vishal; Indian Veterinary Research Institute, Izatnagar (India). Lakshmanan, V.; Indian Veterinary Research Institute, Izatnagar (India). Effect of vitamin E supplementation on growth and meat quality of male Murrah buffalo (*Bubalus bubalis*) calves. Animal Nutrition and Feed Technology (India). (Jul 2011) v. 11(2) p. 221-31 KEYWORDS: WATER BUFFALOES. MEAT. QUALITY. VITAMIN E. GROWTH.

An experiment was conducted on 15 male Murrah buffalo calves (194.0±0.64 kg BW and 14–15 months) to assess the effect of vitamin E supplementation on growth performance and meat quality. The buffalo calves were fed on a standard diet supplemented with 0, 300 and 600 IU vitamin E (α-tocopherol acetate) in group I, II and III, respectively. Feeding continued till the animals attained the slaughter weight of 350 kg. Immediately after sacrificing the animals, carcass samples were collected to study the meat quality. Growth performance of the calves was similar among the groups. Chemical composition of three different muscle samples of carcass showed no variations among the groups for CP, OM, pH and sensory attributes. Moisture content was significantly (P<0.05) higher in semitendinosus (ST) muscles of group III. Peroxide value decreased (P<0.05) and shear force values increased (P<0.05) from group I to III. Total heme pigments in all the groups showed

non-significant ($P < 0.05$) variation except for ST muscle, where supplementation of vitamin E decreased the THP. However, Lovibond tintometer color units for red showed no distinguish trend in three groups. Concentration of vitamin E (ig/g) in the three muscles was higher ($P < 0.01$) in vitamin E supplemented than control group. It may be concluded that supplementation of 300 IU of vitamin E/animal/day increased the muscle vitamin E concentration and shear force value, and reduced the peroxide value of meat.

075. Neeru Bhooshan; Central Institute for Research on Goats, Makhdoom (India). Puneet Kumar; Central Institute for Research on Goats, Makhdoom (India). Singh, S K; Central Institute for Research on Goats, Makhdoom (India). Yadav, M C; Central Institute for Research on Goats, Makhdoom (India). Status of thyroid hormones in blood plasma of goats at different ages and their correlation with other biochemical parameters. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 634-637 KEYWORDS: GOATS. THYROID HORMONES. BIOLOGICAL DEVELOPMENT. BLOOD PLASMA.

Healthy female goats (156: 78 Barbari and 78 Jamunapari goats) of different age groups, managed under semiintensive system of production in semiarid and tropical region were utilized. Blood was collected at days 0 (birth), 30, 90, 180, 270–300, 330–360 besides pre-pubertal, pubertal and post-pubertal (1 week after estrus) ages. Plasma concentration of thyroxine (T_4) and 3–3–5-triiodothyronine (T_3) were significantly influenced by the breed and age of the goats. Significantly highest concentration of T_4 hormone in both the breeds was recorded at birth. After birth, T_4 level decreased sharply and attained significant lower values at 1 month of age in Barbari goats. In Jamunapari goats, T_4 concentration was lower at 30 and 90 days of age compared to all other stages. T_4 concentration started increasing after 1 month of age in Barbari goats and after 3 months of age in Jamunapari goats and remained at significantly high level up to 330–360 days of age. In Jamunapari goats, the highest level was also seen at the age of 270–300 days. At prepubertal, pubertal and post pubertal age, T_4 concentration did not fluctuate significantly. In Barbari goats, T_3 concentration did not change since birth to post-pubertal age except a decrease at 90 days age. In Jamunapari goats, T_3 concentration was generally stable except an increase at 180 days and pubertal age. The plasma T_4 and T_3 hormones were positively correlated with estrogen. T_4 had positive correlation with progesterone. T_3 hormone had significantly positive correlation with mean corpuscular haemoglobin concentration, serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase, amylase, total proteins, total globulin, cholesterol and estrogen.

076. Saini, N.; National Research Centre on Camel, Bikaner (India). Singh, N.; National Research Centre on Camel, Bikaner (India). Kiradoo, B.D.; National Research Centre on Camel, Bikaner (India). Effect of supplementation on intake of minerals, milk yield and blood biochemical profile in lactating camels under traditional and semi intensive system. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 666-670 KEYWORDS: CAMELS. LACTATION. MILK YIELD. FEED ADDITIVES. SUPPLEMENTS. MINERAL NUTRIENTS. BLOOD COMPOSITION. INTENSIVE HUSBANDRY.

Assessment of mineral status from feeding trial revealed that straw feeding under traditional system resulted in deficiency of Ca, P, Cu, Zn and Mn. Effect of supplementation of these minerals was evaluated in terms of intake of dry matter, milk yield and body weight as well as on blood biochemical profile in 8 Bikaneri camels. Group 1 camels were managed under traditional system with supplementary feeding of straw at evening. Camels of group 2 were fed same straw with concentrate and mineral mixture under intensive system. Strategic supplementation resulted in significant increase in dry matter (g/kg 0.75) intake and consequently higher mineral intake in respective group compared to control. The group 2 camels produced more milk (6.11 litre/day) than group 1 (5.37 litre/day) with an average of 463.63 and 408.34 litres, respectively. The dam of group 1 lost 15 kg body weight while dam of group 2 gained 16.75 kg weight with daily gain of 500 g/day with supplementation and thus indicated positive effect on body weight of dam. Similarly, the calves of supplemented group 2 had significantly faster growth with daily gain of 739.25 g/day than non-supplemented group 1 (631.72 g/day). Average blood minerals concentration was above the critical limit and values of P, Cu, Zn and Mn showed significant increase with supplementation of these minerals. Concentration of total protein was significantly higher in supplemented group (6.69 mg%) compared to control (5.95 mg%). The results

indicated that in the existing traditional feeding system supplementation of Ca, P, Cu and Zn are required in diet of lactating camels and dietary supply of these nutrients improved production performance of camel.

077. Dhanda, Suman; Kurukshetra University, Kurukshetra (India). Hari Singh; Kurukshetra University, Kurukshetra (India). Distribution of dipeptidylpeptidase III homologue in brain and vital organs in goat (*Capra hircus*). Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 715-718 KEYWORDS: GOATS. BRAIN. PITUITARY GLAND.

Goat brain dipeptidyl peptidase III (DPP-III) was recently purified and characterized. The crude enzyme preparation had optimum activity at alkaline pH of 8.5. The regional and subcellular distribution of this protease in brain along with its distribution in different goat tissues was investigated. The enzyme activity was associated with the cytosolic fraction when assayed using synthetic substrate Arginyl-Arginyl-4-methoxy- α -naphthylamide (Arg-Arg-4mâNA). The pituitary body had the highest density of the enzyme and thalamus had the least when expressed on the basis of per gram wet tissue weight. Other regions of brain tend to have similar activity. Tissue distribution studies revealed that pancreas was the most enriched with DPP followed by liver, thymus, brain and parotid. Kidney, spleen, thyroid, parathyroid had similar activity whereas lung, heart, skeletal muscle, skin, eye lens and adrenal had comparatively lower activity. Prostate gland and testis were enriched in DPP III activity. In female goat fallopian tubes and ovary had higher activity as compared to the uterus. The enzyme is present in all the tested tissues. This indicates that the enzyme is constitutive thereby suggesting its role in some vitalcellular function.

L51 Animal Physiology- Nutrition

078. Rai, R.B.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Rahman, Shafiqur; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Dixit, Himanshu; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Rai, Sweta; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Singh, Balvir; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Kumar, Harendra; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Reproduction. Damodaran, T.; Central Soil Salinity Research Institute, Lucknow (India). Dhama, K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Analysis of feed ingredients for Afla and T-2 mycotoxins by ELISA in rural areas of Uttar Pradesh. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.238-240 KEYWORDS: FEEDS. INGREDIENTS. AFLATOXINS. MYCOTOXINS. ELISA. UTTAR PRADESH. TOXINS.

A survey of commonly available feed ingredients in rural households of Barabanki and Raebareli districts of Uttar Pradesh was conducted for the presence of afla and T-2 mycotoxins during winter months by commercially available ELISA kits. Out of 88 samples, comprising of 74 feed ingredients and 14 commercial poultry feed, 9% and 24% ingredient samples were negative for afla and T-2 toxins, respectively. Among the positive samples, 20% showed higher level of aflatoxins (20 ppb or more), whereas 35% samples had more than 100 ppb concentration of T-2 toxins. Generally, the problem of aflatoxin has been recorded more in the rainy season and thereafter, because of high relative humidity and optimum temperature. The present study highlighting the occurrence of two important mycotoxins (Aflatoxin and T-2) in feed ingredients of rural areas and the potential threat of mycotoxins on animal and human health requires an upsurge in the mycotoxin surveillance and monitoring even in colder seasons which would help timely follow up of suitable prevention and control strategies for alleviating the economic losses and reducing public health significance.

079. Kumar, B.Y.Sunil; Indian Veterinary Research Institute, Izatnagar (India). Division of Biochemistry. Singh, Gyanendra; Indian Veterinary Research Institute, Izatnagar (India). Kumar, Ajeet; Indian Veterinary Research Institute, Izatnagar (India). Division of Biochemistry. Kataria, Meena; Indian Veterinary Research Institute, Izatnagar (India). Division of Biochemistry. Meur, S.K.; Indian Veterinary Research Institute, Izatnagar (India). Modulation of heat stress in buffaloes by supplementing electrolytes, ascorbate and Zinc.

Indian Journal of Veterinary Research (India). (Jul-Dec 2011) v. 20(2) p.1-8 KEYWORDS: ASCORBIC ACID. WATER BUFFALOES. ELECTROLYTES. HEAT STRESS. ZINC.

The ameliorative effect of salts, ascorbic acid polyphosphate and Zinc oxide supplementation on heat stress was studied in adult buffaloes of either sex which were randomly divided into two groups of four animals each. Group I served as control and Group II was supplemented with sodium bicarbonate, potassium carbonate, ascorbic acid polyphosphate and Zinc oxide. All the animals were exposed to two conditions of temperature and humidity: hot-dry and hot-humid in psychrometric chamber for 4 hours daily for 10 days. Blood was collected on days 1, 5 and 10 of treatment. The activities of enzymes catalase, superoxide dismutase (SOD) and concentrations of reduced glutathione (GSH), hormone cortisol and thiobarbituric acid (TBA) binding substances (lipid peroxidation) were estimated in serum. Significant decrease was observed in activities of serum catalase and SOD. Serum GSH concentration decreased while serum concentrations of TBA binding substances and cortisol significantly increased in both groups which were subjected to heat stress. Dietary supplementation of ascorbate, Zinc and electrolytes resulted in further decrease in the enzymes' activities where as the serum GSH increased at par to normal values. Serum concentrations of TBA binding substances and cortisol were comparatively lower in supplemented group in both types of stress. Thus, supplementation of ascorbate and Zinc in addition to electrolytes relieved the animals of oxidative stress.

080. Palod, Jyoti; College of Veterinary and Animal Sciences, Pantnagar (India). Kumar, A.; College of Veterinary Science, Mathur (India). Department of Animal Nutrition. Singh, V. S.; College of Veterinary and Animal Sciences, Pantnagar (India). Shukia, P.K.; Ministry of Agriculture, New Delhi (India). , Department of Animal Husbandry Dairying and Fisheries. Effect of different levels of organic chromium on egg yolk cholesterol and chromium contents. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p. 69-72 KEYWORDS: CHROMIUM. SUPPLEMENTS. CHOLESTEROL. LAYER CHICKENS.

A feeding trial was conducted in layers for a period of 8 weeks (23-30 weeks old) to evaluate the effect of chromium picolinate supplementation on egg yolk cholesterol and egg chromium content in layers. A total of (n=120) layers were randomly distributed in completely randomized design into 4 treatment groups each with 2 replicates of 5 chicks. The layers of treatment group T₁ (control) were provided water without chromium while those of T₂, T₃ and T₄ were provided water containing 200, 400 and 600 ppb chromium / litre respectively. At the end of feeding trial, six eggs from each replicate, on last three days were used for egg yolk cholesterol and egg chromium studies. The results indicated that the total cholesterol and LDL cholesterol content of eggs were significantly (P<0.05) reduced and HDL-cholesterol content significantly increased in 400 and 600 ppb chromium supplemented group of layers. Whereas chromium content of eggs increased with increasing levels of chromium supplementation. It was concluded that organic chromium supplementation up to 600 ppb level through water may be advisable to reduce egg yolk total cholesterol and LDL-cholesterol and improved HDL-cholesterol and egg chromium content.

081. Dey, Avijit; Indian Veterinary Research Institute, Izatnagar (India). Sharma, K.; Indian Veterinary Research Institute, Izatnagar (India). Dutta, Narayan; Indian Veterinary Research Institute, Izatnagar (India). Singh, M.; Indian Veterinary Research Institute, Izatnagar (India). Singh, A.; Indian Veterinary Research Institute, Izatnagar (India). Effect of replacing wheat bran with rice polishings on the lactation performance of crossbred cows. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1259-62 KEYWORDS: DAIRY COWS. MILK PRODUCTION. PROTEINS. RICE. WHEATS.

082. Das, A.; ICAR Research Complex for NEH Region, Tadong (India). De, D.; ICAR Research Complex for NEH Region, Tadong (India). Katole, S.; ICAR Research Complex for NEH Region, Tadong (India). Seasonal variation in eating behavior and nutritive value of mixed jungle grass for goats. Animal Nutrition and Feed Technology (India). (Jul 2011) v. 11(2) p. 195-202 KEYWORDS: GRASSES. FEED GRASSES. GOATS. FEEDING. BEHAVIOUR. NUTRITIVE VALUE.

Seasonal variation in biomass yield, herbal and chemical composition, samples of mixed jungle grass were assessed by conducting three digestibility trials during the month of August (monsoon), December (winter) and May (summer). During each period, 4 Sikkim local adult, non-producing does (body weight 19.1±1.8 kg) were stall fed with mixed jungle grass ad libitum. After a preliminary feeding period of 22 days a digestibility trial of 5-day collection period was conducted during each of the season mentioned. Biomass yield of the pasture of mid altitude location of Sikkim was maximum during monsoon, followed by winter and summer. DM and CF contents were significantly ($P<0.01$) less and CP content was significantly ($P<0.01$) more in samples collected during monsoon in comparison to those collected during winter and summer. The time spent on rumination during summer month was higher ($P<0.01$) than monsoon. Time spent on eating (min) per 100g DM was 42.40, 37.08 and 42.23 in summer, monsoon and winter, respectively. Time spent (min) on ruminating per 100g DM was higher ($P<0.01$) in summer months (124.75) as compared with monsoon (86.63) and winter (108.15). Dry matter intake and digestibility was significantly ($P<0.01$) higher in monsoon than summer and winter. Nutritive value of mixed jungle grass in terms of DCP and TDN content was found to be significantly ($P<0.01$) higher in monsoon season as compared to winter and summer. It was concluded that quality of pasture was superior during monsoon in comparison to winter and summer.

083. Sharma, Sanjita; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). Sharma, Vishnu; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). Purohit, G.R.; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). Effect of replacing groundnut cake with various nitrogen sources of arid region on nutrient utilization and rumen fermentation pattern in Marwari goats. *Animal Nutrition and Feed Technology* (India). (Jul 2011) v. 11(2) p. 233-40 KEYWORDS: NITROGEN. ARID ZONES. NUTRITION PHYSIOLOGY. GOATS.

An experiment was conducted to assess the effect of replacing groundnut cake with different nitrogen sources of arid zone on feed intake, nutrient utilization and rumen fermentation pattern. Various sources used were tumba (*Citrullus colocynthis*), taramira (*Eruca sativa*) and matira (*Citrullus lanatus*) oilseed cakes and compared with conventional groundnut cake in beri pala (*Ziziphus nummularia*) leaf based complete diets for Marwari goats. A metabolic trial was conducted on 16 mature bucks. The control diet (T_1) contained 50:50 concentrate-roughage ratio with conventional protein source groundnut cake (GNC). In experimental diets 50 per cent nitrogen of GNC was replaced by Tumba (T_2), Taramira (T_3) and Matira (T_4) oilseed cakes. No significant difference was observed for digestibility of various nutrients except fibre. In T_2 group i.e. tumba cake, CF digestibility vary significantly ($P<0.05$) with T_3 group i.e. taramira seed cake. Statistically no significant difference was observed for digestible dry matter intake (DDMI), digestible crude protein (DCP) and total digestible nutrients (TDN). All the animals of four treatment groups had positive balances regarding nitrogen, calcium and phosphorus and no significant differences was observed for rumen parameters viz., rumen pH, total volatile fatty acids, rumen ammonia nitrogen and total protozoal count. Study suggests that 50 per cent nitrogen of GNC can be easily replaced with tumba, taramira and matira seed cakes for effective goat production in arid regions.

084. M Bharath Kumar; Madras Veterinary College, Chennai (India). Sriram, P; Madras Veterinary College, Chennai (India). Vijayarani, K; Madras Veterinary College, Chennai (India). Vijayakumar, C; Madras Veterinary College, Chennai (India). Mathuram, L N; Madras Veterinary College, Chennai (India). Effects of salinomycin and sodium fumarate on rumen fermentation using rumen simulation technique. *Indian Journal of Animal Sciences* (India). (Jul 2010) v. 80(7) p. 638-641 KEYWORDS: RUMEN DIGESTION. RUMEN MICROORGANISMS. SALINOMYCIN. FEED ADDITIVES.

The objective of this study was to determine the effect of salinomycin and sodium fumarate on rumen fermentation. The apparent digestibility of basal ration was reduced by salinomycin appreciably at low doses, whereas, sodium fumarate tended to increase it without any change in pH, bacterial count and ammonia nitrogen level. Salinomycin produced a dose-dependent decrease in protozoal count whereas sodium fumarate did not produce any significant change. Microbial protein increased with the addition of salinomycin, whereas

sodium fumarate did not produce any significant change in microbial protein synthesis. Salinomycin increased the molar proportion of propionate and reduced the acetate, butyrate and acetate: propionate ratio. Sodium fumarate also reduced acetate: propionate ratio, but increased both acetate and propionate concentrations. Salinomycin and sodium fumarate reduced methane production, however the reduction brought about by sodium fumarate was not comparable with ionophore. Thus, it was concluded that salinomycin and sodium fumarate may be a useful dietary additive for ruminants.

085. Chandrasekharaiah, M.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Thulasi, A.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Sampat, K.T.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Effect of variable rumen degradable nitrogen levels on microbial protein synthesis estimated with purine derivatives in sheep urine and PDC index. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 674-678 KEYWORDS: SHEEP. BIODEGRADABILITY. RUMEN DIGESTION. RUMEN MICROORGANISMS.

An experiment was conducted to study the effect of varying rumen degradable nitrogen (RDN) levels on microbial protein synthesis in sheep by measuring excretion of purine derivatives in spot urine samples and purine derivatives: creatinine (PDC) index. Sheep (30) were divided into 5 groups of 6 each and the animals in all groups were fed fingermillet straw (FMS) as a basal diet and soybean extraction as a nitrogen source. The animals in group 1 were fed with ad lib. FMS. Animals in group 2, 3, 4 and 5 were offered soybean extraction 16.16, 20.65, 24.75 and 26.64 g RDN/kg DOM along with FMS. The experimental feeding was continued for 2 months followed by metabolism trial. The purine derivatives (mmol/litre) excretion and PDC index were 18.74 and 34.37; 17.88 and 40.68; 20.82 and 42.62; 15.92 and 49.36 and 16.92 and 45.62; 15.92 and 49.36 and 16.92 and 45.44, in group 1 through 5, respectively. The microbial purine absorption, the microbial nitrogen (MN) supply (g/d) were comparable among the RDN supplemented groups. Purine nitrogen index (PNI) and nitrogen conversion efficiency (NCE) values were 0.10 and 1.17; 0.10 and 0.78; 0.07 and 0.65 and 0.06 and 0.62, respectively, in G 2 through 5. The result indicated that 16.16 g RDN from soybean extraction may be adequate for optimum microbial protein synthesis in sheep fed on FMS based diet.

086. Anil Kumar; Indian Grassland and fodder Research Institute, Jhansi (India). Alzahal, O.; Indian Grassland and fodder Research Institute, Jhansi (India). Singh, K.K.; Indian Grassland and fodder Research Institute, Jhansi (India). McBride, B.W.; Indian Grassland and fodder Research Institute, Jhansi (India). Amino acid profile of chaya and its protein degradation rates in dairy cattle. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 737-740 KEYWORDS: DAIRY CATTLE. CNIDOSCOLUS. FORAGE. NUTRITION PHYSIOLOGY. PROTEIN METABOLISM.

Chaya (*Cnidocolus aconitifolius*, family Euphorbeaceae), is a perennial shrub, the leaves of which are eaten by the Mayan people in Central America. To explore its potential use as livestock fodder, the amino acid profile and protein degradation rates in fodder chaya containing leaves and succulent stems were analyzed. The amino acid contents (g/100 g protein) in chaya fodder were methionine (0.61), lysine (5.90), arginine (3.62), threonine (2.12), leucine (5.29), isoleucine (3.20), valine (3.73), histidine (1.42) and phenylalanine (4.23). Chaya fodder was rich in lysine, leucine, phenylalanine and valine. The lysine, leucine and valine content in chaya fodder were similar to soybean meal and alfalfa hay. Chaya fodder contains 47.7% of rumen undegradable protein which may be useful in high milk producing cattle. In addition, chaya fodder protein solubility in the rumen is 27.95% of CP (Fraction A 5.72% plus Fraction B1 22.23%). Protein Fraction B2, which is intermediately degraded in the rumen, was 33.77% of CP and Fraction B3, most of which escapes degradation was 24.72% of CP. Fraction C, which is unavailable to the animal, was 13.56% of protein. This study showed that all the amino acids required to support 10 kg/d of milk production were met by feeding a diet composed solely of chaya fodder.

087. Chandrasekharaiah, M.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Thulasi, A.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Sampath, K.T.; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Estimation of microbial protein synthesis

efficiency in sheep using purine nitrogen index and nitrogen capture efficiency. *Indian Journal of Animal Sciences (India)*. (Aug 2010) v. 80(8) p. 758-763 KEYWORDS: SHEEP. GROUNDNUT MEAL. BIODEGRADABILITY. RUMEN DIGESTION.

An experiment was conducted to evaluate the efficiency of utilization of rumen degradable nitrogen (RDN) for optimum microbial protein synthesis in sheep by the use of possible potential parameters such as purine nitrogen index (PNI) and nitrogen capture efficiency (NCE), which was estimated from purine derivatives excretion in spot urine samples. Sheep (36) were divided into 4 groups of 9 each and the animals in all groups were fed finger millet straw (FMS) as a basal diet and groundnut cake (GNC) as a nitrogen source. The animals in group 1(G1) were fed with ad lib. FMS. Animals in groups 2, 3 and 4 (G2, G3 and G4) were offered GNC14, 18, and 23 g RDN/kg digestible organic matters (DOM) along with FMS. The experimental feeding was continued for 1 month followed by a metabolism trial of 7days. A total of 4 spot urine samples from each sheep were collected at 6 h intervals each day during last week of 1 month feeding period. The total purine derivatives (mmol/litre) excretion and purine derivatives; creatinine (PDC) index recorded were 17.52 and 38.07; 20.53 and 50.09; 24.30 and 51.10 and 18.65 and 39.17, respectively in G1, 2, 3 and 4, respectively. The microbial purine absorption, the calculated microbial nitrogen (MN) supply (g/d) was comparable among the RDN supplemented groups (G2, G3 and G4). PNI and NCE values recorded were 0.19 and 1.40; 0.19 and 1.05 and 0.13 and 0.62, respectively in G2, G3 and G4. The results indicated that 14 g RDN from GNC may be adequate for optimum microbial protein synthesis in sheep fed on FMS based diet. Further, PNI and NCE estimated in spot urine of sheep fed ad lib. appeared to be useful in evaluation of ruminant diets.

088. Saijpaal, S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Naik, P.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Neelam Rani; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effects of rumen protected fat on in vitro dry matter degradability of dairy rations. *Indian Journal of Animal Sciences (India)*. (Oct 2010) v. 80(10) p. 993-997 KEYWORDS: IN VITRO EXPERIMENTATION. BIODEGRADABILITY. RUMEN DIGESTION. CONCENTRATES.

Rumen protected fat (PF) was incorporated in 12 concentrate mixtures (CM1-CM12) and total mixed rations (TMR1- TMR12) to study the effect of different levels of PF in dairy rations and the effect of urea in dairy rations containing limited grains and high PF on in vitro dry matter degradability (IVDMD) and in vitro fermentation. The CM1 contained 6% natural fat and no PF whereas, in CM², CM3, CM4, CM5, CM6 and CM7, the natural fat was replaced 30, 40, 50, 60, 70 and 80% by PF, respectively. The CM8-CM12 contained limited cereal grains (5–10%), high deoiled rice polish (50–60%) without (CM8-CM10) or with 1% urea (CM11-CM12), in which 80% natural fat was replaced by PF to increase the fat content. The 12 total mixed rations (TMR1-TMR12) contained respective CMs (CM1-CM12) and green sorghum in 50: 50 ratios on DM basis. Increasing the deoiled ingredients in CM1-CM7 increased the CP and NDF content but, IVDMD remained similar. Limited grain, high PF based CMs (CM8–CM12) with or without urea had comparable chemical composition but, IVDMD was lower in urea containing CMs. The chemical composition of TMR1-TMR7 showed significant variation and lower IVDMD when PF replaced more than 40% natural fat. The IVDMD in TMR8- TMR12 showed inconsistent variations. No difference ($P<0.05$) in in vitro fermentation (TVFA, TN, TCA-N, NPN and NH₃-N) was observed between CM1-CM7, CM8-CM12, TMR1-TMR7 and TMR8-TMR12. It was concluded that the PF can substitute up to 40% of the natural fat of the CMs (6% natural fat) contained in TMRs (50: 50, R: C). In rations with limited grain (5–10%) and high PF, 1% urea can reduce IVDMD.

089. Wadhwa, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). N. Kaur; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Bakshi, M.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). . Degradability of Protein Fractions of Conventional and Non-conventional Protein Supplements. *Animal Nutrition and Feed Technology (India)*. (Jul 2010) v. 10(2) p. 235-243 KEYWORDS: PROTEIN CONCENTRATES. SUPPLEMENTS. NUTRITION PHYSIOLOGY.

Conventional [solvent extracted groundnut cake (GNC) and mechanically extracted mustard cake (MC)] and non-conventional protein supplements [mechanically extracted castor oil seed cake (COSC), un-decorticated solvent extracted neem seed cake (NSC) and corn gluten meal (CGM)] and their protein fractions were evaluated for their degradation in the rumen. Protein supplements before and after rumen incubations (for 0, 2, 4, 6, 8, 12, 24, 36 and 48 hrs) were subjected to sequential fractionation into albumin, globulin, glutelin and prolamins on the basis of solubility. The concentration of soluble proteins (albumin and globulin) was observed to be higher ($P<0.05$) in COSC, whereas that of insoluble protein (glutelin and prolamin) fractions was higher ($P<0.05$) in CGM. The globulin constituted the major ($P<0.05$) soluble fraction of all protein supplements selected. The 48 h crude protein degradability of groundnut and mustard cake (98 and 94%) was comparable to that of castor oil seed cake (98%), but significantly higher than that of neem seed cake (69%) and corn gluten meal (37%). The degradability of soluble protein fractions was higher ($P<0.05$) than that of insoluble protein fractions. Irrespective of protein supplements, the degradability of globulin was highest ($P<0.05$), followed by albumin, glutelin and prolamin. It was concluded that GNC and COSC were highly susceptible to rumen micro-organisms, resulting in negligible amount of rumen undegradable protein fraction, while CGM showed great resistance to rumen microbes.

090. Ganie, Ajaz Ahmad; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Baghel, R.P.S.; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Mudgal, Vishal; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Sheikh, G.G.; College of Veterinary Science and Animal Husbandry, Jabalpur (India). Department of Animal Nutrition. Effect of Selenium Supplementation on Growth and Nutrient Utilization in Buffalo Heifers. *Animal Nutrition and Feed Technology (India)*. (Jul 2010) v. 10(2) p. 255-259 KEYWORDS: HEIFERS. SELENIUM. SUPPLEMENTARY FEEDING. GROWTH. NUTRITION PHYSIOLOGY.

Twenty buffalo (*Bubalus bubalis*) heifers of 18–36 months of age (239.0 ± 16.46 kg) were divided into two groups ($n=10$ per group). Animals in the control (T_1) group were fed diet comprising of concentrate mixture (40% maize, 44% mustard cake, 8% wheat bran, 5% arhar chuni, 2% mineral mixture and 1% common salt) and wheat straw ad libitum. Animals in the experimental group (T_2) were also fed same basal diet except that they were supplemented with 0.2 ppm selenium (Se) in their concentrate mixture. Experimental feeding lasted for 120 days including a 7 days digestion trial. The intake of DM and digestibility of DM, CP, EE, CF and NFE were similar ($P<0.05$) between the two groups. While supplementation of Se had no effect on DCP intake, TDN intake was significantly ($P<0.05$) higher in T_2 group. Average daily gain (ADG) of the buffalo heifers was also significantly ($P<0.05$) higher in group T_2 as compared to the control (T_1) group up to 300 kg body weight. However, after 300 kg body weight there was no effect of selenium supplementation on ADG. These results suggest that Se supplementation (0.2 ppm in concentrate mixture) improves the growth performance of buffalo heifers during early stages.

091. Dubey, C.S.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Mondal, B.C.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Tiwari, D.P.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Kumar Anil; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Yadav, C.L.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Effect of Plane of Nutrition on Nutrient Utilization, Haemato-biochemical Parameters and Immune Response in *Haemonchus contortus* Infected Sheep. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 27-39 KEYWORDS: SHEEP. NUTRITION PHYSIOLOGY. BLOOD COMPOSITION. IMMUNE RESPONSE. HAEMONCHUS CONTORTUS. HAEMONCHUS.

Eighteen Muzaffarnagari adult sheep, aged 11–13 months and average body weight of 28.90 kg infected with *Haemonchus contortus* divided into 3 groups of 6 animals each were fed three levels of concentrate mixture (groundnut cake and wheat bran in 70: 30 ratio) i.e. low plane (200 g), medium plane (300 g) and high plane (400 g) to groups 1, 2 and 3, respectively, along with ad libitum mixed green fodder (green maize+grasses) to discern the effect on nutrient utilization, certain haemato-biochemical parameters and immune response. The feeding trial lasted for 90 days. There was significantly higher daily dry matter, TDN and DCP intakes ($P<0.05$) in sheep of group 3 and 2 than group 1. Digestibility coefficients for DM, OM, CP and NFE were significantly ($P<0.01$) higher in sheep fed high plane and medium plane of concentrate mixture. Blood samples collected from each animal on 0, 30th, 60th and 90th day post feeding periods showed that total erythrocyte counts and differential leukocyte counts were not affected significantly due to plane of nutrition and values were within the normal physiological range, however, lymphocyte ($P<0.01$) and neutrophil ($P<0.05$) counts differed significantly at the start of feeding trial and later on the values did not differ among the groups. The eosinophil counts were significantly ($P<0.01$) lower in group 3 on 60 days of feeding, whereas on 90th day, sheep in groups 2 and 3 had lowered eosinophil counts. Serum globulin concentration in response to *H. contortus* infection was influenced much in high plane of nutrition as compared to low plane. The antibody titer in sheep of groups 2 and 3 was significantly ($P<0.01$) higher as compared to group 1 from 30 day feeding trial onwards. The over all average faecal egg counts in the experimental sheep were significantly ($P<0.05$) lower in groups 2 and 3 than in group 1. It was concluded that higher plane of nutrition improved nutrient utilization and immune status in sheep infected with *H. contortus*.

092. Pawar, M.M.; Indian Veterinary Research Institute, Izatnagar (India). Pattanaik, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Kumar Puneet; Indian Veterinary Research Institute, Izatnagar (India). Sharma, K.; Indian Veterinary Research Institute, Izatnagar (India). Goswami, T.K.; Indian Veterinary Research Institute, Izatnagar (India). Metabolic and Immunological Response in Dogs Fed Homemade Diet with Augmented Nutrient Profile. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 71-80
KEYWORDS: DOGS. FEEDS. INGREDIENTS. METABOLISM. METABOLITES. IMMUNE RESPONSE.

Metabolic and immunological response was assessed in ten Spitz pups, divided into two groups, fed on homemade diet. The control group was fed with rice and milk based homemade diet and experimental group with augmented composition to optimize the nutrient profile as per AAFCO (1994) recommendation. The feeding trial was continued for period of 150 days. Cell-mediated immune (CMI) response was assessed at 110 d of study, by measuring the delayed-type hypersensitivity (DTH) reaction to intra-dermal inoculation of phytohaemagglutinin-p (PHA-p) mitogen. Further, lymphocyte subsets were assessed by fluorescent activated cell sorter technique. Humoral immune response was assessed by inoculation of *Leptospira* antigen at 120 d post-feeding, and subsequently measuring levels of immunoglobulin G (IgG) in serum collected at 0, 7, 14 and 28 days of post-inoculation. To assess the blood metabolites and erythrocytic antioxidants, cephalic vein blood samples were collected at monthly intervals. Dietary treatment did not show any effect ($P<0.05$) on CMI assessed through DTH response to PHA-p. Significant variations were also noticed in the population of CD4, CD8 and CD4: CD8 ratio. The level of serum IgG was higher ($P<0.05$) in experimental group than in control group. Data on metabolic indices revealed higher ($P<0.05$) levels of haemoglobin, plasma total protein, calcium and phosphorus accompanied by increased erythrocytic antioxidants viz. catalase and total thiol groups in experimental group compared to control group. However, the levels of plasma lipid profile, urea and creatinine were found to be significantly ($P<0.05$) lower in experimental group than the control. Results suggested improvement in health of dogs by optimizing the nutrient profile of rice-milk based homemade diet.

093. Kumar, R.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Kamra, D.N.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Agarwal, N.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Chaudhary, L.C.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Zadbuke, S.S.; Indian Veterinary Research Institute,

Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Effect of Tree Leaves Containing Plant Secondary Metabolites on In vitro Methanogenesis and Fermentation of Feed with Buffalo Rumen Liquor. Animal Nutrition and Feed Technology (India). (Jan 2011) v. 11(1) p. 103-114 KEYWORDS: WATER BUFFALOES. DIGESTIVE JUICES. RUMEN MICROORGANISMS. METHANOGENS. FERMENTATION.

The leaves of *Mangifera indica* (mango), *Eugenia jambolana* (jamun), *Aegle marmelos* (bel), *Zyzipus jujuba* (ber), *Azadirachta indica* (neem) and *Ficus religiosa* (peepal) extracted in three solvents (water, ethanol and methanol) were tested for their effects on gas and methane production, in vitro true digestibility (IVTD) and rumen fermentation characteristics in an in vitro gas production test. Gas production per gram dry matter (DM) of a substrate (wheat straw and concentrate mixture in 1:1 ratio) reduced ($P < 0.05$) with leaf extracts of *E. jambolana* and *Z. jujuba*. The highest inhibition of methane production was observed with methanol extract (35.7% inhibition) followed by ethanol extract (23.2% inhibition) and water extract (9.2% inhibition) of *M. indica* leaves, but there was no effect on acetate to propionate ratio and IVTD of the feed with these extracts. Methanol extract of *E. jambolana* also inhibited methane emission by 24.1%. IVTD of the feed decreased ($P < 0.05$) with addition of the extracts of *E. jambolana*, *A. marmelos* and *Z. jujuba* leaves. Antiprotozoal activity was observed with *M. indica*, *E. jambolana* and *A. indica* leaf extracts which was mainly due to a reduction in spirotrichs counts, however, holotrichs were not affected. The results indicated that methanol extract of mango leaves (*M. indica*) appeared to have a potential to inhibit rumen methanogenesis without adversely affecting other rumen fermentation characteristics.

094. Sandhya, A.; College of Veterinary Science and Animal Husbandry, Durg (India). Department of Animal Nutrition. Rajagopal, S.; College of Veterinary Science and Animal Husbandry, Durg (India). Department of Animal Nutrition. Tiwari, S.P.; College of Veterinary Science and Animal Husbandry, Durg (India). Department of Animal Nutrition. Dubey, M.; College of Veterinary Science and Animal Husbandry, Durg (India). Department of Animal Nutrition. Rumen Metabolic and Blood Biochemical Profile of Sahiwal Calves and Murrah Buffalo (*Bubalus bubalis*) Calves Fed Diet Containing De-oiled Sal (*Shorea robusta*) Seed Meal. Animal Nutrition and Feed Technology (India). (Jan 2011) v. 11(1) p. 123-131 KEYWORDS: WATER BUFFALOES. SHOREA ROBUSTA. OIL CROPS. ANIMAL FEEDING. BLOOD COMPOSITION.

The study was conducted on fifteen male Sahiwal and fifteen male Murrah buffalo calves of about 12 months age. They were divided into three equal groups of five calves of Sahiwal and five calves of Murrah buffalo in each. In both the cases the animals were fed three concentrate mixtures, T_1 , T_2 and T_3 . T_1 is control without deoiled sal seed meal (DSSM), while T_2 and T_3 with 35% and 70% DSSM respectively. The other ingredients of concentrate mixture comprised of maize, peanut cake, deoiled rice bran, mineral mixture, salt and vitamin premix (Rovimix). The concentrate mixture contained CP 17% and TDN 65%. Green Para grass (*Brachiara mutica*) was offered ad libitum as roughage to all the animals. There was maximum degradation of diet at 4 h followed by 8 and 12 h in both the species. The total volatile fatty acids, total nitrogen, ammonia N and TCA precipitable N concentration in rumen liquor was significantly low due to feeding of 70% DSSM in buffalo calves. In sahiwal calves significantly lower concentration of total N, NH_3 -N and TCA precipitable N was reported in T_2 and T_3 as compared to T_1 . The activity of carboxy methyl cellulase and urease enzyme in the rumen liquor was higher in T_1 as compared to T_2 and T_3 although statistically non significant. Inclusion of DSSM to the levels 35% and 70% in the ration did not significantly alter the plasma protein, albumin, globulin, and albumin: globulin ratio, blood urea nitrogen, serum creatinine, AST, ALT and Alkaline phosphatase concentration in both the species. It is concluded that DSSM was better utilized in buffalo calves as compared to sahiwal calves.

L52 Animal Physiology - Growth and Development

095. Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Pathak, Devendra;

Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prenatal and postnatal development of tassels in the goat: A histomorphological study. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1185–86 KEYWORDS: GOATS. DEVELOPMENTAL STAGES. PERINATAL PERIOD.

096. Gadariya M.R.; Gujarat Agricultural University, Anand (India). Patel, A.M.; Gujarat Agricultural University, Anand (India). Adhwani, K.N.W.; Gujarat Agricultural University, Anand (India). Dhami, A.J.; Gujarat Agricultural University, Anand (India). Studies on physiological responses to different cart-loads, post-work regain pattern and distress score in Kankrej and Jersey×Kankrej bullocks in comfort and stressful seasons. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p.1263-66 KEYWORDS: BULLOCKS. STRESS. RESISTANCE TO INJURIOUS FACTORS. CROSSBREDS.

097. Jadhav, N. V.; Production Management Veterinary College, Bidar (India). Department of Livestock; Suranagi, M.D.; Production Management Veterinary College, Bidar (India). Department of Livestock; Anjaneya S.N.; Production Management Veterinary College, Bidar (India). Department of Livestock Prakashchandra; Production Management Veterinary College, Bidar (India). Department of Livestock. Mallikarjunappa S.; Production Management Veterinary College, Bidar (India). Department of Livestock. Effect of replacing soybean meal and dicalcium phosphate in the diets with alternative ingredients and phytase supplementation on growth and nutrient balance in broiler chicken. Animal Nutrition and Feed Technology (India). (Jul 2011) v. 11(2) p. 203-10 KEYWORDS: DICALCIUM PHOSPHATE. PHYTASE. SUNFLOWER MEAL. BROILER CHICKENS.

The study was conducted for evaluating the effect of phytase supplementation on growth and nutrient balance in broiler chicken fed diets containing sunflower meal (SFM) as a partial replacement for soybean meal and two different levels of dicalcium phosphate (DCP) with or without exogenous phytase. The experiment was carried out using 300 broilers from 1 to 35 day of age. There were 5 dietary treatments in each with 4 replicates of 15 birds in each. Soybean meal in control diet was partially replaced using 20% SFM with either 1 or 2 percent DCP supplementation; each level of DCP was again supplemented with 500 FTU/kg of a commercial phytase. Phytase supplemented chickens recorded significantly ($P<0.01$) higher body weight, feed conversion ratio and dressing yield when compared with non-supplemented birds. The nutrient retention was significantly ($P<0.01$) higher in the broilers supplemented with phytase compared to non-supplemented rations. The economic benefit analysis (on feed cost) revealed higher net returns in broilers fed with rations having alternative ingredients and supplemented with phytase when compared with birds on reference diet. It can be concluded that SFM can replace SBM by 20 percent along with 50 percent substitution of DCP by limestone when supplemented with phytase.

098. Shukla, Saraswati; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences Tiwari, D.P; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences Kumar, Anil; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences Mondal, B.C.; G.B. Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences. Availability of feed resources and animal feeding practices in Pauri district of Uttarakhand. Animal Nutrition and Feed Technology (India). (Jul 2011) v. 11(2) p. 211-9 KEYWORDS: FEEDS. FARMERS. FEED RESOURCES. LIVESTOCK. NUTRIENTS.

A survey was conducted through common questionnaire to find out the existing animal feeding practices followed by the farmers (15 in each village) belonging to four villages, two each from Kotdwar and Lansdown tehsils in Pauri district (hill region) of Uttarakhand. Based on the land holding farmers were categorized into landless (3.33%), marginal (36.67%), small (46.66%) and medium (13.33%) with family size ranging from 5.53 to 6.87. It was observed that landless, marginal, small and medium farmers had 3.38, 41.22, 36.15 and 19.26 per cent of total livestock population, respectively. The average milk production ranged from 2.30 to 13.90

lts./day/family. Animals were stall fed in the morning and evening and allowed for grazing during day time. The livestock owners of the target area used to feed wide range of common green grasses, tree leaves, cultivated fodders and dry fodder. In both tehsils, concentrate feeding included commercial concentrate pellet, readymade concentrate mixture, wheat bran and homemade concentrate mixture. There was no practice of providing mineral mixture to the animals while 76.67 per cent farmers used to provide common salt to their livestock in both the tehsils. The major reproductive problems observed in the study area were anoestrus (16.67 and 23.33% in Kotdwar and Lansdown tehsils, respectively), repeat breeding (20.00 and 23.33% in Kotdwar and Lansdown tehsil, respectively) and others like prolapse of uterus, dystocia etc. (10.00 and 11.66% in Kotdwar and Lansdown tehsils, respectively). Long calving interval (cattle 17.10 and buffaloes 20.24 months) and higher age at first calving (cattle 3.76 and buffaloes 3.91 yrs) were also observed. Animals of surveyed area exhibited negative balance for DM, DCP and TDN intakes. It was concluded that animals must be provided adequate amount of feeds and fodder along with mineral mixture supplementation to sustain dairy enterprises.

L53 Animal Physiology – Reproduction

099. Pathak, Devendra; Guru Angad Dev Veterinary & Animal Science University, Ludhiana (India). Department of Veterinary Anatomy. Bansal, Neelam; Guru Angad Dev Veterinary & Animal Science University, Ludhiana (India). Department of Veterinary Anatomy. Status of oviduct of buffalo during follicular and luteal phases of estrous cycle: A histological and histochemical perspective. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.42-47 KEYWORDS: WATER BUFFALOES. OVIDUCTS. OESTROUS CYCLE.

Different segments of oviduct (infundibulum, ampulla, isthmus and utero tubal junction) of six buffaloes each during follicular and luteal phases of estrous cycle were studied. The samples were collected in 10% NBF processed for paraffin sectioning were stained with hematoxylin and eosin, Masson's trichrome, Periodic Acid Schiff, alcian blue and PAS alcian blue. The mucosa was found thrown into longitudinal folds having primary, secondary and tertiary branches. Branching was more pronounced in infundibulum and ampulla as well as during the follicular phase as compared to luteal phase. The different segments were lined with columnar to pseudostratified columnar epithelium. The cells were ciliated and non ciliated type. In follicular phase, the epithelium showed strong PAS reaction which was concentrated in the supranuclear zone while during the luteal phase the reaction was moderate. The reaction was granular in nature. The epithelium was also strongly positive for alcian blue and PAS alcian blue during follicular phase. The propria submucosa, tunica muscularis and tunica serosa showed weak to mild reaction for PAS and alcian blue.

0100. Malik, R.K.; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Deptt. of Animal Production Physiology. Tuli, R.K.; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Deptt. of Animal Production Physiology. Dipanker,; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Deptt. of Livestock Production & Management. Singh, Pardeep; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Deptt. of Animal Production Physiology. Influence of thawing temperature on sperm survivability and fertility in buffaloes with frozen semen of Murrah bulls. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.54-57 KEYWORDS: EGGS. QUALITY. BULLS. FERTILITY. SEMEN. WATER BUFFALOES.

The effect of two thawing temperatures (37°C for 30 sec. and 60°C for 7 sec.) on sperm survivability and conception rate in buffaloes with frozen semen of Murrah bulls was compared. Thawing at 60°C resulted in statistically significant increase ($P < 0.05$) in sperm survivability (motility, live spermatozoa and intact acrosomes) compared with thawing at 37°C. In all, 161 buffaloes were inseminated with frozen semen thawed at 37°C and 159 buffaloes with semen thawed at 60°C between 2006-07 and 2009-10. Conception rate of 64.15% and 50.31% was obtained with semen thawed at 60°C and 37°C, respectively, and the difference was significant ($P < 0.05$). Artificial insemination of buffaloes with frozen semen thawed at 60°C for 7 sec. could be safely used to improve both sperm survivability and conception rate in buffaloes.

0101. Sadhan Bag; (Indian Veterinary Research Institute, Izatnagar (India). Mehre, P. V.; Indian Veterinary Research Institute, Izatnagar (India). Majumdar, A.C.; Indian Veterinary Research Institute, Izatnagar (India). Effect of season on oocyte maturation and embryo development in buffalo. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 618-620 KEYWORDS: WATER BUFFALOES. OVA. SUPEROVULATION. EMBRYONIC DEVELOPMENT. SEASONS.

An attempt was made to find out the effect of season on oocyte maturation and embryo development in buffalo during low breeding season when environmental temperature was high. Oocytes were isolated from oocytes brought from local slaughter house during different months, viz. March (group 1), April (group 2) and May (group 3), when the environmental temperature was high. Isolated oocytes during different months were matured in TCM-199 with 10% FBS supplemented with follicular fluid and FSH (0.5ug/ml). Matured oocytes were fertilized by co incubating capacitated frozen thawed buffalo semen. After co incubation the oocytes were cultured in mSOF and cleavage rate and embryo development was noted. A total number of 1 340 buffalo ovaries were collected from local slaughterhouse, from which 1 080 culturable cumulus oocytes complexes (COCs) were recovered. The overall recovery rate of buffalo oocytes was 0.85 oocyte/ovary in the present study. The maturation rate of oocytes was 68.00 to 87.57%. The cleavage rate as well as morula stage embryo development in March (group 2), April (group 2) and May (group 3) were of 8.27 and 2.5, 5.6 and 3.1, 8.18 and 5.4% respectively. The average cleavage rate and morula stage embryo development were 9.60% and 4.60%.

0102. Puri, G.; Indian Veterinary Research Institute, Izatnagar (India). Sadhan, Bag; Indian Veterinary Research Institute, Izatnagar (India). Das, B.C.; Indian Veterinary Research Institute, Izatnagar (India). Anees, C.; Indian Veterinary Research Institute, Izatnagar (India). Nath, N.C.; Indian Veterinary Research Institute, Izatnagar (India). Majumdar, A.C.; Indian Veterinary Research Institute, Izatnagar (India). Effect of different concentrations of serum supplementation on proliferation of embryonic cells derived from early stage in-vitro buffalo embryos. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 621-622 KEYWORDS: IN VITRO CULTURE. WATER BUFFALOES.

An attempt was made to study the effect of different culture condition on derivation of ES cell from IVF derived early stage embryos in buffalo. Early stage 16–32 cell stage IVF derived embryos were treated with proteinase-K for zona removal. The zona free embryos were cultured on mitomycin-c inactivated buffalo feeder cells in medium supplemented with different percentages of serum. It was observed that blastomere clump attached to the feeder cells within 24 h and multiplied. Supplementation of 20% FCS to the culture supported the multiplication of blastomere cells better than the supplementation of 10 or 15% serum. In some cases, there was formation of blastocyst like structure with distinct inner cell like mass although there were no trophectodermal cells at the border. When the inner cell like mass from the blastocyst like structure was cultured on inactivated feeder cells, no primary colony developed.

0103. Boni, K.K.; Assam Agricultural University, Guwahati (India). Sarmah, S.; Assam Agricultural University, Guwahati (India). A comparative study on polyacrilamide gel electrophoretic pattern of serum protein fractions during normal and sub-oestrous cycle of crossbred cattle of Asom. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 653-655 KEYWORDS: CATTLE. CROSSBREDS. OESTROUS CYCLE. BLOOD PROTEINS. ELECTROPHORESIS.

The present work was carried out to study variation of cyclic protein fractions in serum of crossbred cattle of Asom during sub-oestrous condition and normal oestrous cycle. The blood samples were collected on day 0, 5, 10, 15 and 20 (day 0 of the next cycle). The total protein concentration was estimated by using standard method. The samples were subjected to nondissociating polyacrylamide gel electrophoresis. The comparative study of variation of different protein fractions during different days of sub-oestrous and normal cyclic cows revealed presence of six protein bands representing albumin, α 1-globulin, α 2-globulin, β 1-globulin, β 2-globulin and γ -globulin were marked with no much difference. The variation of result might be due to cyclic phenomenon and it could be explained as species specific under agroclimatic condition of Asom.

0104. Maurya, S.K.; Project Directorate on Cattle, Meerut Cantt (India). Mathur, A.K.; Project Directorate on Cattle, Meerut Cantt (India). Oestrogen and progesterone concentration in Frieswal cows during superovulation. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 725-726 KEYWORDS: COWS. SUPEROVULATION. OESTROGENS. PROGESTERONE.

Ten normal adult healthy cyclic Frieswal cows were utilized for this study. These animals were divided into two groups of 5 animals each. Superovulation was induced in the first group by utilizing 280 mg of NIH-FSH P1 in 8 divided doses given in 4 days. In the second group PMSG was utilized 1500 IU/animal as a single i/m injection. All the 10 animals were given injection of PGF₂α (PG) 0.7 mg after 66 hrs of FSH/PMSG injection for induction of oestrus and were subsequently inseminated with frozen thawed semen. The blood samples were collected for the estimation of oestradiol 17β and progesterone at the end of natural oestrus, prior to superovulatory treatment, just before PG injection and at the end of induced oestrus. The mean oestradiol 17β concentration estimated just before the start of superovulation treatment were 163 ± 37.20 and 149 ± 47.54 pg/ml whereas the concentrations of progesterone were 4.95 ± 1.53 and 4.45 ± 1.48 ng/ml in 1 and 2 superovulatory treatment groups respectively. It was observed that after 60 h of start of superovulatory treatment the levels of estradiol 17β were 109 ± 40.70 and 90 ± 30.78 pg/ml in group 1 and 2, these values at the end of induced oestrus were 148.0 ± 54.4 and 85.0 ± 29.88 pg/ml in group 1 and 2. Similarly, mean progesterone concentrations after 60 h of start of superovulatory treatment were 4.28 ± 1.9 and 4.19 ± 0.99 ng/ml in groups 1 and 2, which were 2.91 ± 0.83 and 3.65 ± 1.58 ng/ml at the end of induced oestrus. Here also levels were showing lower trend on compared to mean values obtained just before the start of experiment (i.e. 4.8 ± 2.12 and 4.9 ± 2.01 ng/ml).

0105. Malik, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Singh, P.; Central Institute for Research on Buffaloes, Hisar (India). Sharma, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Singh, I.; Central Institute for Research on Buffaloes, Hisar (India). Tuli, R.K.; Central Institute for Research on Buffaloes, Hisar (India). Estrus and fertility response of postpartum anestrous Murrah buffaloes to Crestar and OvSynch treatment regimens. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 982-985 KEYWORDS: WATER BUFFALOES. OESTROUS CYCLE. SEXUAL BEHAVIOUR. INDUCED OVULATION. OESTRUS SYNCHRONIZATION.

Primiparous postpartum anestrous Murrah buffaloes (15) were randomly divided into 2 groups to receive either Crestar (n=7) and OvSynch treatment (n=8) to evaluate their efficacy for induction of estrus. Estrus was induced in 100% and 87.5% buffaloes in Crestar and OvSynch group, respectively, with mean interval to ovulation of 2.86±0.13 and 1.29±0.36 days. The postpartum interval to conception was also higher in OvSynch group animals (332.8±23.4 vs 238.0±23.6 days). A conception rate of 71.4% to first insemination at induced estrus was recorded in Crestar group, whereas it was only 12.5% in OvSynch treated animals though respective overall pregnancy rates up to third insemination were 85.7 and 75%. In conclusion, ovulatory estrus could be successfully induced following Crestar treatment yielding satisfactory conception rates at induced estrus.

L70 Veterinary Science and Hygiene

0106. Sujatha, K.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Pathology. Srilatha, Ch.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Pathology. Anjaneyulu, Y.; Sri Venkateswara Veterinary University, College of Veterinary Science, Tirupati (India). Department of Pathology. Rao, T.S. Chandrasekhar; College of Veterinary Science, Hyderabad (India). Department of Pathology. Sreenivasulu, D.; Sri Venkateswara Veterinary University, College of Veterinary Science, Tirupati (India). Department of Microbiology. Amaravathi, P.; Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science, Department of Pathology. Ameliorative efficacy of Ocimum sanctum leaf extract in lead acetate induced toxicity in Wistar albino rats: a pathomorphological study. Indian Journal of Veterinary Pathology (India). (Dec

2011) v. 35(2) p.147-152 KEYWORDS: OCIMUM. LEAVES. EXTRACTION. LEAD. LEAVES. LEAVES. TOXICITY. RATS.

In the present investigation, 216 healthy adult 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 and histopathological changes were studied in different organs. Dose dependent changes were noticed in all the organs. Liver revealed congestion, degenerative changes, moderate to severe fatty changes, proliferation of bile ducts and microgranuloma in all lead treated groups. In kidneys, degenerative changes, intertubular haemorrhages, atrophied and cystic glomeruli were observed in majority of higher doses of lead treated rats. Lungs of higher doses of lead treated groups revealed moderate to severe congestion, edema, perivascular and peribronchiolar infiltration of mononuclear cells. Histopathologically, cerebrum revealed congestion, submeningeal haemorrhages, degenerative changes in neurons, gliosis and demyelinating changes in all lead treated groups. Moderate to severe depletion of germinal centers were noticed in the spleen and lymph nodes. Based on the changes, it was concluded that lead acetate at 60 mg/ Kg b.wt. and 30 mg/ Kg b.wt. for 12 weeks was toxic to rats and ameliorative effect of OS was moderate in higher lead dose group and amelioration was effectively observed in lower dose levels of lead acetate.

0107. Hore, S.K.; UP Pt. Deen Dayal Upadhyaya Veterinary Science University, Mathura (India). College of Veterinary Sciences and Animal Husbandry, Department of Veterinary Pharmacology and Toxicology. Garg, Satish K.; UP Pt. Deen Dayal Upadhyaya Veterinary Science University, Mathura (India). College of Veterinary Sciences and Animal Husbandry, Department of Veterinary Pharmacology and Toxicology. Batra, Munish; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Department of Veterinary Pharmacology and Toxicology. Ahmad, A.H.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Department of Veterinary Pharmacology and Toxicology. Withania somnifera root extract attenuates lead induced clinicopathological effects in rats. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35 (2) p.153-158 KEYWORDS: PATHOLOGY. LEAD. RATS. WITHANIA SOMNIFERA.

Present study was undertaken to evaluate the protective potential of withania somnifera root extract (WRE) against lead-induced clinicopathological alterations in rats. No apparent clinical signs were observed in any of the test groups -control, lead alone (0.5% lead acetate) and WRE (1%) +(0.5% lead acetate) in drinking water of rats during the 12 weeks study period. Body weights, weight gain, and organ weights (absolute and relative) in animals of lead alone treated group were severely and significantly ($P < 0.05-0.001$) altered while in lead+WRE treated rats, these indices were less severely affected and were almost comparable to the values of control group. Similarly, gross and histopathological studies revealed severe damage to liver, kidneys, spleen and testes in lead-alone treated group while the lesions were less severe in lead+WRE treated rats. These observations suggested that Withania somnifera root extract offering protection against lead toxicity in rats.

0108. Bodade, Jyoti; Maharashtra Animal & Fishery Sciences University, Nagpur Veterinary College, Nagpur (India). Department of Microbiology. Kalorey, D.R.; Maharashtra Animal & Fishery Sciences University, Nagpur Veterinary College, Nagpur (India). Department of Microbiology. Kurkure, N. V. ; Maharashtra Animal & Fishery Sciences University, Nagpur Veterinary College, Nagpur (India). Department of Pathology. Tongaonkar, S.S.; V. H. Ltd., Pune (India). Ventri Biologicals Vaccine Division. Vitamin E as an adjuvant in NDV and IBDV vaccines for poultry. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35 (2) p.184-188 KEYWORDS: VITAMIN E. ADJUVANTS. INFECTIOUS BURSAL DISEASE VIRUS. VACCINES. POULTRY. IMMUNE RESPONSE.

The immunogenicity and protective capability of D, L- \pm -tocopheryl acetate (vitamin E) adjuvanted Newcastle disease (ND) + Infectious bursal disease (IBD) inactivated vaccine was evaluated in broiler chicks.

Results showed that the vaccine supplemented with vitamin E induced more rapid and higher antibody response than control vaccines. Post challenge with virulent ND and IBD virus, absolute protection was recorded in chicks earlier vaccinated with ND + IBD vaccine containing adjuvant replaced with 20 and 10 per cent vit. E respectively. Post challenge gross and histopathological lesions were minimum in-group vaccinated with vitamin E adjuvanted vaccine. Our results provide an evidence that vitamin E can be used efficiently as component of inactivated ND + IBD vaccine to induce protective immune response in birds.

0109. Bhardwaj, Ujala; Birsa Agricultural University, Ranchi (India). Department of Veterinary Microbiology. Tiwary, B.K.; Birsa Agricultural University, Ranchi (India). Department of Veterinary Microbiology. Prasad, Arun; Birsa Agricultural University, Ranchi (India). Department of Veterinary Microbiology. Ganguly, Subha; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Fish Processing Technology. Study on the post-inoculation histopathological effect of *Tinospora cordifolia* extract on skin of broiler chicks. *Indian Journal of Veterinary Pathology* (India). (Dec 2011) v. 35 (2) p.225-226 KEYWORDS: CHICKS. HISTOPATHOLOGY. TINOSPORA. BROILER CHICKENS. EXTRACTS.

The present study was carried out to determine the immunomodulatory properties particularly the effect on cell mediated immune response of *Tinospora cordifolia* stem extracts in broiler chicks. Their skin sections instilled with *T. cordifolia* stem extract were examined which showed marked infiltration of mononuclear cells in the dermis of skin.

0110. Samanta, A.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Niyogi, D.; Narendra Deva University of Agriculture and Technology, Faizabad (India). College of Veterinary Science & Animal Husbandry, Department of Veterinary Pathology. Ganguly, S.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). AICRP on Post Harvest Technology in Department of Fish Processing Technology. Singh, Y.D.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Pal, S.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Pradhan, S.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Patra, N.C.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Mukhopadhyay, S.K.; West Bengal University of Animal and Fishery Sciences. Kolkata (India). Department of Veterinary Pathology. Study on immunosuppressive effect of vaccination against infectious bursal disease. *Indian Journal of Veterinary Pathology* (India). (Dec 2011) v. 35 (2) p.227-229 KEYWORDS: BROILER CHICKENS. INFECTIOUS BURSAL DISEASE VIRUS. VACCINES.

The study was carried out to describe the effect of two commercially available infectious bursal disease (IBD) intermediate plus vaccines on immune system of broiler chickens having maternal antibody against infectious bursal disease virus (IBDV). IBD vaccines proved to be immunogenic as indicated by ELISA titers on 24th and 38th day of age. However, IBD vaccines induced bursal atrophy as indicated by studies on the ratio between bursal weight and body weight on 19th, 29th and 38th day of age. Histopathological studies of lymphoid organs indicated that the vaccines induced bursal damage after vaccination. Antibody response to vaccination against Newcastle disease (ND) measured at 31st and 38th day of age showed significantly low ($P < 0.05$) ND haemagglutination inhibition antibody titers as compared to birds of control group indicating immunosuppressive effects of both the IBD vaccines on the immune system. From the present study, it was revealed that vaccine against IBD vaccines imposed immunosuppressive effect.

0111. Mahajan, S.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Singh, S.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Mohindroo, J.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Singh, N.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of

Veterinary Science, Department of Veterinary Surgery and Radiology. Saini, N.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Sood, N.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Science, Department of Veterinary Surgery and Radiology. Accuracy of ultrasound guided biopsy (USGB) and ultrasound guided fine needle aspiration biopsy (USG-FNAB) for diagnosis of abdominal affections in dogs. Indian Journal of Veterinary Research (India). (Jul-Dec 2011) v. 20 (2) p.20-23 KEYWORDS: ASCARIDIA. OVA. WASHING.

USGB with biopsy gun using free hand technique was found to be an easy, safe and accurate technique for obtaining sufficient and good quality tissue for histopathological diagnosis in cases of hepatic, renal, prostatic, splenic affections and abdominal masses in dogs. Similarly USG-FNAB with 20-22 G needles attached with 5-10ml disposable syringe using free hand technique was found to be an easy, safe, economical, accurate and reliable technique for obtaining sufficient and good quality samples for cytological diagnosis in cases of splenic and prostatic affections and abdominal masses in dogs.

0112. Rajora, V. S.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). College of Veterinary and Animal Sciences, Department of Clinical Medicine., Gupta, D.K.; College of Veterinary Science, Ludhiana (India). Clinical Veterinary Medicine. Bhatt, P.; Veterinary Clinics, Hardoi (India). Nag, L.K.; Veterinary Officer, Hardoi (India). Therapeutic efficacy of topical formulations against dermatological disorders in dogs. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20 (2) p.32-34 KEYWORDS: DOGS. SKIN DISEASES. DISORDERS. GARLIC. EXTRACTS. LEAD.

The therapeutic efficacy of two formulations, one containing garlic and other lead carbonate and acetate, camphor, neem and eucalyptus oils were assessed in 18 and 29 clinical cases of dermatological disorders in dogs, respectively. None of the preparation showed satisfactory results against mange infestation. Both the preparations were almost equally effective in cases of fungal and non-specific dermatitis.

0113. Bhatt, P.; College of Veterinary and Animal Sciences, Pantnagar (India). Veterinary Clinics. Shukla, Alok; Brookes Hospital for Animals, New Delhi (India). Jadeja, V. S.; Brookes Hospital for Animals, New Delhi (India). Gupta, D.K.; College of Veterinary and Animal Sciences, Pantnagar (India). Veterinary Clinics. Dabas, Y.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Management and treatment of idiopathic tetanus in a horse. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20 (2) p.35-37 KEYWORDS: HORSES. TETANUS. MANAGEMENT.

A case of idiopathic tetanus in a horse was treated with large doses of long acting penicillins along with tetanus anti toxins, tetanus toxoid, muscle relaxants and metronidazole. Supportive medication included parenteral dextrose saline, antioxidants, nervine tonics and restoratives. The successful treatment of the case over a period of fifteen days was recorded.

0114. Parihar, Shradha; College of Veterinary Sciences & Animal Husbandry, Mhow (India). Department of Veterinary Pathology. Garg, U.K.; College of Veterinary Sciences & Animal Husbandry, Mhow (India). Department of Veterinary Pathology. Shrivastava, Nidhi; College of Veterinary Sciences & Animal Husbandry, Mhow (India). Department of Veterinary Pathology. Immuno-pathological effect of Argemone maxicana in broilers (*Gallus domesticus*). Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.38-41 KEYWORDS: ARGEMONE MEXICANA. BROILER CHICKENS. HISTOPATHOLOGY. IMMUNOSUPPRESSION.

An experiment was conducted on 100 day in old broiler chicks to study the immunosuppressive potential of Argemone mexicana seeds toxicity. Toxicity was induced by administering crushed Argemone seeds 5, 10, 20 and 30 grams per Kg of feed in treatment groups T₁, T₂, T₃ and T₄ respectively whereas the Control group was maintained on the normal feed. The birds in the treatment groups showed the symptoms like dullness, depression and ruffled feathers. The body weight gain (BWG) was poor in comparison to control. The lymphoid organ to body weight ratio, HI titers and percentage of active macrophage were found significantly reduced.

The histopathological lesions revealed marked lymphoid depletion indicative of immunosuppressive potential of Argemone seeds.

0115. Gera, Sandeep; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Department of Veterinary Physiology and Biochemistry. Guha, Anirban; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Department of Veterinary Physiology and Biochemistry. Evaluation of lactate dehydrogenase, alkaline phosphatase and aspartate aminotransferase activity in milk as an indicator of subclinical mastitis in Holstein x Haryana cows. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.48-53 KEYWORDS: ALKALINE PHOSPHATASE. ASPARTATE AMINOTRANSFERASE. CROSSBREDS. COWS. LACTATE DEHYDROGENASE. MASTITIS.

Pertaining to the scenario at hand milk samples from Holstein x Haryana crossbred cows were investigated for alternation in enzyme activity as influenced by sub clinical mastitis (SCM) and their percent sensitivity, specificity, accuracy, positive and negative predictive values, positive and negative likelihood ratios and correlation with (somatic cell count) SCC were calculated. It was found that SCM influence significantly the activity of ALP at pO.O and LDH at pO.O5 in milk. Aspartate amino transferase activity was not influenced by SCM in milk. Moreover, both were found to be correlated with somatic cell count, significantly. From the likelihood ratios it was clear that both alkaline phosphatase (ALP) and LDH can be used for diagnosis of SCM, but, ALP is the safe indicator of SCM in the present study.

0116. Barua, C.C.; Assam Agricultural University, Guwahati (India). Barua, A.G.; Assam Agricultural University, Guwahati (India). Roy, J.D.; Assam Agricultural University, Guwahati (India). Buragohain, B.; Assam Agricultural University, Guwahati (India). Borah, P.; Assam Agricultural University, Guwahati (India). Studies on the anti-inflammatory properties of *Drymaria cordata* leaf extract. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1168–70 KEYWORDS: ANTI-INFLAMMATORY AGENTS. CARRAGEENANS. FORMALDEHYDE.

The anti-inflammatory effects of *Drymaria cordata* methanolic extract (DCME) at the doses 300 to 900 mg/kg body wt. p.o was evaluated and compared with control and standard drug - Indomethacin (10 mg/kg body wt. p.o.). Carrageenan induced paw oedema model in rats and mice, formalin-induced paw licking in mice were used for evaluation. Anti-inflammatory effect of DCME was dose dependent and comparable with the standard drug- Indomethacin in carrageenan induced paw oedema in rat and mice. In formalin-induced paw licking model, there was significant reduction in duration of paw licking in early and late phase as well. Therefore, it can be concluded that DCME possesses anti-inflammatory property which could be due to presence of flavanoids, alkaloids and steroids.

0117. Pathania, R.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Sharma, S.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Pharmacokinetics of moxifloxacin in *Escherichia coli* lipopolysaccharide-induced febrile buffalo calves. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 601-604 KEYWORDS: MEDICINAL PROPERTIES. ANTIBIOTICS. CALVES. FEVER.

Pharmacokinetics and urinary excretion of moxifloxacin was studied in *Escherichia coli* lipopolysaccharide (1 mg/kg b.wt., iv)-induced fever in buffalo calves (n=6). A single intravenous dose of 5 mg/kg body weight was administered in each of the 6 buffalo calves once body temperature was elevated by 1–2°C. Pharmacokinetic analysis of disposition data was best described by 2 compartment open model. The concentration of moxifloxacin in plasma of febrile buffalo calves was detected up to 12 h. The elimination half life and volume of distribution of moxifloxacin after intravenous administration were 2.99±0.10 h and 1.79±0.14 L/kg respectively. The distribution half-life and area under curve (AUC) were 0.09±0.01 h and 12.3±0.76 µg/ml h respectively. The total body clearance (CIB) and tissue : plasma (T:C) ratio were 414.3 ± 24.9 ml/kg/h and 0.22 ± 0.05 respectively. At the end of 24 h, the urinary excretion was approximately 10% of total dose. Using the surrogate marker of AUC/MIC, it was determined that a dosage of 5 mg/kg of

moxifloxacin administered by the IV route in febrile buffalo calves is likely to be effective against bacterial isolates with MIC 0.1 µg/ml.

0118. Sonawane, R. K.; Indira Gandhi Krishi Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Husbandry. Tiwari, S.K.; Indira Gandhi Krishi Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Husbandry. Sharda, R.; (Indira Gandhi Krishi Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Husbandry. Kalim, M.O.; (Indira Gandhi Krishi Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Husbandry. Kashi Nath; (Indira Gandhi Krishi Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Husbandry. Bupivacaine with and without detomidine and ketamine for epidural analgesia in buffalo calves - Clinicophysiological study. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 605-607 KEYWORDS: WATER BUFFALOES. ANALGESICS. CALVES.

The present study was conducted on 15 healthy non-descript, male buffalo calves aging 6 to 8 months to evaluate the efficacy of bupivacaine alone and in combination with ketamine and detomidine for lumbar epidural analgesia. The calves were randomly divided into 3 groups, viz. group A (bupivacaine alone), group B (bupivacaine and ketamine), and in group C (bupivacaine and detomidine) were administered. The onset of analgesia was significantly earlier in group C animals (5.65 ± 1.86 min) as compared to group B (5.87 ± 1.77 min) and group A (10.73 ± 2.82 min). In group A animals, analgesia was mild to moderate of thorax and flank, while it was moderate to complete in group C and B. In inguinal, perineum, hind limbs and tail regions analgesia was mild to moderate in group C, whereas it was very mild to mild in group A and B. The duration of analgesia and recovery time was significantly longer in group C than in groups A and B. The mean respiration rate and heart rate decreased significantly in groups A and C, whereas it increased significantly in group B.

0119. Singh, G.D.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Jadon, N.S.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Aubid Hussain; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Sharma, V. K. Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Sevoflurane and isoflurane anaesthesia in acute abdomen canine patients. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 613-617 KEYWORDS: DOGS. ANAESTHESIA. ACUTE COURSE. ABDOMEN.

The present study was aimed to prepare a suitable anaesthetic combination of sevoflurane or isoflurane in acute abdomen critically ill canine patients. Acute abdomen was due to anatomical anomalies and due to lodgement of foreign bodies in the animals of group A and B respectively. The animals of group C were the normal healthy dogs used as control. These animals were further divided into 2 sub groups AI, All, BI and BII. The animals of subgroup AI, BI, and CI were subjected to administration of anaesthetic combination of atropine sulphate 0.04 mg/kg body weight, diazepam 1 mg/kg body weight, I.M. thiopental sodium 10–12 mg/kg body weight I. V. (just to pass endotracheal tube) and sevoflurane (3–3.5%) while the animals of sub group AII, BII and CII were subjected to the administration of anaesthetic combination of atropine sulphate 0.04 mg/kg body weight, diazepam 1 mg/kg body weight, I.M. and thiopental sodium 10–12 mg/kg body weight I.M. just to pass endotracheal tube, followed by isoflurane (2–2.5%). The efficacy of anaesthetic combinations was determined by observing different clinicophysiological and haematobiochemical parameters. There was a complete muscle relaxation in all the groups of animals. Corneal, palpebral reflexes were completely depressed during the surgical anaesthesia. An increase in heart rate and total erythrocyte count along with a decrease in respiration rate, rectal temperature, respiratory minute volume, haemoglobin, packed-cell volume, total leucocyte count and neutrophil count was observed during the period of anaesthesia. A gradual decrease in the mean values of total protein, albumin, gamma glutamyl transferase and calcium was observed during anaesthesia. These changes were less pronounced in group subjected to sevoflurane as compared to isoflurane. On the basis of the findings observed in this study it was concluded that the combination of thiopental sodium and sevoflurane was more safe as compared to the combination of thiopental sodium and isoflurane as it provides more cardiac and respiratory stability.

0120. Malik, Y.P.S.; Indian Veterinary Research institute, Mukeswar (India). Chand, P.; Indian Veterinary Research institute, Mukeswar (India). Detection and characterization of soluble proteins of sheep pox virus. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 707-710 KEYWORDS: CAPRIPOXVIRUS. IMMUNOBLOTTING. ELECTROPHORESIS.

Soluble proteins of sheep pox virus produced in lamb testis (LT) cells were investigated using graded precipitation of the virus-free culture supernatants with saturated ammonium sulphate solution. The proteins were separated from infected culture supernatants at 45% (A), between 45 and 60% (B) and from 60 to 80% (C) saturation of ammonium sulphate. SDS-PAGE and immunoblot analyses of the soluble proteins revealed a total of 33 and 24 proteins, respectively, with molecular weights ranging from 14 to 181 kDa. of the 33 soluble proteins, 15 proteins in preparation A, 30 in B and 28 in C were detected in SDS-PAGE, whereas 6 proteins in preparation A, 21 in B and 18 in C showed reaction in immunoblotting. In SDS-PAGE of partially purified virus preparation (PPV) 18 proteins were detected. of these, 8 were common with the proteins present in soluble protein preparations (A/B/C). These soluble proteins could be used as diagnostic antigen.

0121. De, S.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Sanyal, P.K.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Pan, D.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Bera, A.K.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Bandyopadhyay, S.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Pal, S.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Mandal, S C; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Sarkar, A.K.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Patel, N.K.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Bhattacharya, D; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Das, S.K.; Indira Gandhi Krishi Viswavidyalaya, Durg (India). Assessment of genetic relation of Indian isolates of four predatory fungi through RAPD markers. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 711-714 KEYWORDS: FUNGI. GENETIC MARKERS. GENETIC VARIATION. RAPD.

The polymerase chain reaction (PCR) method was used to differentiate 4 commonly occurring deuteromycetes (fungi imperfecti), viz. *Paecilomyces lilacinus*, *Verticillium chlamydosporium*, *Duddingtonia flagrans* and *Arthrotrichum oligospora* using short sequence oligonucleotide primers. A total of 146 amplicons were identified in the genomic DNA of 4 fungi. Maximum genetic similarity was found in between *Paecilomyces lilacinus* and *Verticillium chlamydosporium* (39.96%) while *Duddingtonia flagrans* and *Verticillium chlamydosporium* showed the least (22.5%). Though the fungi are placed in the same group (fungi imperfecti) the results indicate the status of their distinct genotype at molecular level.

0122. Bibu, K.J.; Kerala Agricultural University, Mannuthy (India). Jor, A.D.Kerala Agricultural University, Mannuthy (India). Protective effect of *Mangifera indica* Linn. on gentamicin induced nephrotoxicity in rats. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 965-968 KEYWORDS: RATS. TOXICITY. PLANT EXTRACTS. DISEASE CONTROL.

Nephroprotective effect of stem bark of *Mangifera indica* (*M. indica*) against gentamicin-induced nephrotoxicity in male Sprague Dawley rats was assessed. Rats administered with gentamicin daily 80 mg/kg i/p, for 8 days showed an increase in lipid peroxidation and a decrease in superoxide dismutase, catalase and reduced glutathione. Significant ($P < 0.05$) increase in serum creatinine and urea levels was also observed. Histopathological examination of kidney revealed extensive proximal tubular necrosis with marked glomerular changes. Ethanolic extract of *M. indica* at a dose rate of 100 mg/kg p.o. and 500 mg/kg p.o. showed a significant ($P < 0.05$) reduction in lipid peroxidation and an increase in the activities of superoxide dismutase, catalase and reduced glutathione, which suggest its efficacy in scavenging free radical-induced renal damage. The ethanolic herbal extract also showed a reduction in serum creatinine and serum urea levels. These effects were predominant with 500 mg/kg p.o. Histopathological examination of tissue sections revealed tubular vacuolar degeneration and necrosis in a dose dependent manner. Thus, the study revealed that treatment with ethanolic extract *M. indica* inhibited gentamicin-induced proximal tubular necrosis though the dose rate was not sufficient to provide complete protection.

0123. Barua, C.C.; Assom Agricultural University, Guwahati (India). Begum, S.A.; Assom Agricultural University, Guwahati (India). Talukdar, A.; Assom Agricultural University, Guwahati (India). Pathak, D.C.; Assom Agricultural University, Guwahati (India). Sarma, D.K.; Assom Agricultural University, Guwahati (India). Bora, R.S.; Assom Agricultural University, Guwahati (India). Wound healing activity of methanolic extract of leaves of *Achyranthes aspera* Linn using in vivo and in vitro model—a preliminary study. *Indian Journal of Animal Sciences (India)*. (Oct 2010) v. 80(10) p. 969-972 KEYWORDS: WOUNDS. HEALING. PLANT EXTRACTS. RATS.

Wound healing activity of methanolic extract of *Achyranthes aspera* Linn. was evaluated by excision and incision wound model (in vivo) in Sprague Dawley rats and by chorioallantoic membrane (CAM) model (in vitro) in 9-day-old embryonated chicken eggs. In excision wound, there was 82.23% wound contraction in control group on 21st day, whereas in *A. aspera* treated group, complete healing took place on 21st day. In the standard group, the wound persisted beyond 21st day. These findings were confirmed by histopathological examination. In incision wound, tensile strength of the healing tissue of *A. aspera* treated group was comparable with standard group and both were significantly higher compared to the control group. In CAM model, angiogenesis in *A. aspera* treated group 400 ig/disc was compared to the control group suggesting promising wound healing activity of methanolic extract of *A. aspera*.

0124. Sangaran, A.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). John, L.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Serodiagnosis of hydatidosis in buffaloes by counter immuno electrophoresis (CIE) and enzyme linked immunosorbent assay (ELISA). *Indian Journal of Animal Sciences (India)*. (Oct 2010) v. 80(10) p. 980-981 KEYWORDS: WATER BUFFALOES. ECHINOCOCCOSIS. IMMUNODIAGNOSIS. ELISA. IMMUNOELECTROPHORESIS.

Using counter immuno electrophoresis (CIE) and enzyme linked immunosorbent assay (ELISA), 100 sera samples collected from 75 buffaloes with known hydatid cysts and 25 buffaloes without any visible hydatid cysts on slaughter were screened. By CIE, 52 sera samples were positive out of 75 buffaloes with hydatid cysts whereas 4 sera samples were detected positive from the 25 buffaloes without visible hydatid cysts. In ELISA, 65 sera samples of the 75 buffaloes with hydatid cysts proved positive and only 1 serum sample was positive from the remaining 25 sera samples screened. The sensitivity and specificity of CIE was 69% and 84% whereas in ELISA, it was 87% sensitive and 96% specific. Hence, the use of these serological tests may be of use in antemortem diagnosis of hydatidosis instead of knowing the disease only after the death of animals and confirmation on postmortem. Between the 2 serological tests used in the present study, ELISA is preferred to CIE owing to its better sensitivity and specificity and the only disadvantage with ELISA is the cost involvement. It is preferred in screening large number of sera samples rather than a few sera samples.

0125. Sadariya, K.A.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Pharmacology and Toxicology. Gothi, A.K.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Pharmacology and Toxicology. Patel, S.D.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Pharmacology and Toxicology. Bhavsar, S.K.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Pharmacology and Toxicology. Thaker, A.M.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Pharmacology and Toxicology. Safety of Moxifloxacin following repeated intramuscular administration in Wistar rats. *Veterinary World (India)*. (Oct 2010) v. 3(10) p. 449-452 KEYWORDS: LABORATORY ANIMALS. ANTIBIOTICS. ANTIMICROBIAL PROPERTIES.

Moxifloxacin is a novel fourth generation fluoroquinolone with broad spectrum of antibacterial activity. The study was conducted to evaluate the safety of Moxifloxacin (5.0 mg/kg) after repeated intramuscular administration at 24 h interval for 14 days in male and female wistar rats. Hematological (Haemoglobin, RBC, WBC, MCV, MCH, MCHC, HCT and DLC), blood biochemical parameters (AST, ALT, ALP, Total Bilirubin,

Total Serum Protein, Serum Albumin, Globulin, Serum Creatinine, Urea, Uric acid and Blood glucose) and histopathological examination of various tissues were carried out in the present study. Male and female animals of any group did not reveal any clinical symptoms and mortality attributable to the 14 days intramuscular administration of Moxifloxacin. The data were compared by unpaired two tails 't' test using Graph Pad Prism (Version 4.00). All above hematological and blood biochemical parameters were found to fluctuate within normal range during treatment period and the mean values were not significantly differ (p 0.05) from corresponding control values. Moreover, no gross or microscopic changes were found in the liver, kidney, heart, spleen, stomach, intestine and joint cartilages of the treated wistar rats. Results indicate that daily administration of Moxifloxacin for 14 days seems to be safe and well tolerated in rats.

0126. Sharma, A.K.; Birsa Agricultural University, Ranchi (India). College of Veterinary Science and Animal Husbandry. Hemant Kumar; Birsa Agricultural University, Ranchi (India). College of Veterinary Science and Animal Husbandry. Dass, L.L.; Birsa Agricultural University, Ranchi (India). College of Veterinary Science and Animal Husbandry. Shivendra Kumar; Birsa Agricultural University, Ranchi (India). College of Veterinary Science and Animal Husbandry. Vinod Kumar; Birsa Agricultural University, Ranchi (India). College of Veterinary Science and Animal Husbandry. Migration of broken hypodermic needle in the cervical muscles of dog. *Veterinary World (India)*. (Oct 2010) v. 3(10) p. 476 KEYWORDS: DOGS. SURGICAL OPERATIONS.

A Spitz bitch of 21/2 years of age was presented in the Department with complaint of anorexia, depression, frothy salivation and distress. However, history of vomition was lacking. The bitch evinced pain on palpation of cervical region. The Radiograph revealed the presence of a linear radioopaque body lodged in the cervical musculature just above the vertebrae. A broken hypodermic needle was retrieved from the cervical musculature just above the last cervical vertebrae, following faulty mode of injection in the cervical region which is not advocated for pets.

0127. Chakravarthi. V. P.; Natural Remedies Pvt. Ltd, Bangalore (India). Balaji Sri N.; Natural Remedies Pvt. Ltd, Bangalore (India). Applications of Nanotechnology in Veterinary Medicine. *Veterinary World (India)*. (Oct 2010) v. 3(10) p. 477-480 KEYWORDS: VETERINARY MEDICINE. DIAGNOSIS.

In the recent years the application of nanotechnology in human and veterinary medicine has shown a great progress. Scientists foresee that this progress in the field of nanotechnology could represent a major breakthrough in addressing some of the technical challenges faced by human and veterinary profession. While the great hopes of nanomedicine are disease detection and new pharmaceuticals for humans, veterinary applications of nanotechnology may become the proving ground for untried and more controversial techniques from nanocapsule vaccines to sex selection in breeding. Nanotechnology has the potential to impact not only the way we live, but also the way we practice veterinary medicine. Examples of potential applications in animal agriculture and veterinary medicine include disease diagnosis and treatment delivery systems, new tools for molecular and cellular breeding, the security of animal food products, modification of animal waste, pathogen detection, and many more. Existing research has demonstrated the feasibility of introducing nanoshells and nanotubes into animals to seek and destroy targeted cells. These building blocks of nanotechnology are expected to be integrated into systems over the next couple of decades on a commercial basis. This article describes some of the principal areas of nanotechnology currently being undertaken in the world of medicine. The main purposes of this article are to trigger the interest of discoveries of veterinary profession in the field of nanotechnology and to provide a glimpse at potential important targets for nanotechnology in the field of veterinary medicine. Also it is important to mention that because nanotechnology is at a very early stage of development, it may take several years to perform the necessary research and conduct clinical trials for obtaining meaningful results. This tool as it develops over the next several decades will have major implications in veterinary and animal science.

L72 Pests of Animals

0128. Chandra, Dinesh; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. Singh, K.P.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. Rathore, Rajesh; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. Raina, O.K.; Division of Parasitology. Varghese, Anju; Division of Parasitology. Acute fasciolosis in cattle and buffaloes in Bareilly district. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.133-135 KEYWORDS: CATTLE. WATER BUFFALOES. FASCIOLASIS. FASCIOLA. UTTAR PRADESH. MORBIDITY. MORTALITY. ANAEMIA.

Disease investigation on morbidity and mortality in cattle and buffaloes in two villages of Bareilly district of Uttar Pradesh was carried out in the month of June 2010. Common symptoms were off feed, low intake of water, dark faeces and death after suffering for 15-20 days. On clinical examinations, affected animals showed normal rectal temperature. In two necropsied buffaloes, the body cavities contained large amount of straw colored fluid mixed with fibrin flakes. Liver was found severely affected with hemorrhagic tracts and perforations with immature flukes in the pool of blood in hepatic parenchyma. The migratory haemorrhagic tracts were full of necrotic debris, cellular and haemorrhagic mass. Mononuclear cell reaction was observed along the side of necrotic haemorrhagic tracts. Occasionally these were encircled by proliferating connective tissue infiltrated by mononuclear cells. Hundreds of immature flukes recovered after teasing of liver were identified as *Fasciola gigantica* of about 8 weeks age but faecal examination showed *F. gigantica* eggs only in two buffaloes and amphistome eggs in all animals. Blood examination revealed anaemia and increased eosinophil count (9-38%). On microbiological examinations, no pathogenic organism could be isolated from the blood samples of the affected animals. On the basis of symptoms, post-mortem findings and laboratory examinations, the disease could be diagnosed as acute fasciolosis due to immature *F. gigantica* infection.

0129. Swarnkar, C.P.; Central Sheep and Wool Research Institute, Avikanagar (India). Singh, D.; Central Sheep and Wool Research Institute, Avikanagar (India). Worm-control practices, anthelmintic use and its implication on anthelmintic resistance in gastrointestinal nematodes of sheep in Rajasthan. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p 593-600 KEYWORDS: SHEEP. NEMATODE CONTROL. ANTHELMINTICS. RAJASTHAN.

The base line information on management of sheep flocks with greater emphasis on worm control practices was collected from sheep farmers of Rajasthan. The status of anthelmintic resistance in gastrointestinal nematodes against commonly available anthelmintics (benzimidazole, tetramisole and closantel) was determined through faecal egg count reduction test, and results were correlated with flock-management practices. Information obtained from this study indicates lack of knowledge about worm-control strategies, anthelmintic use and the problem of anthelmintic resistance among the majority of sheep farms. There is high prevalence of benzimidazole resistance (86.4%) and moderate prevalence of tetramisole resistance (55.7%) with distinct regional variation. The existing drench frequency is not justifiable and there is a high opportunity to harvest the benefits of agro-climatic conditions, grazing resources and practices to save money by avoiding unnecessary en-mass treatments in sheep flocks of Rajasthan. The predominance of *Haemonchus contortus* (Rudolphe, 1803) and use of all types of anthelmintics revealed that there is a need to educate farmers and extension workers on appropriate anthelmintics to be used in their locality. Animals shared the same pasture sources particularly in monsoon and post-monsoon season, thus to prevent borrowing and probability of emergence of multiple resistance. There is a need to coordinate farmers in all management systems at a community or village level with respect to use of anthelmintic type for a particular year with greater involvement of researchers, pharmaceuticals, field veterinarian and extension workers.

0130. Saha Roy, S.; West Bengal University of Animal and Fisheries Sciences, Kolkata (India). Pramanik, A.K.; West Bengal University of Animal and Fisheries Sciences, Kolkata (India). Sarkar, S.; West Bengal University of Animal and Fisheries Sciences, Kolkata (India). Misra, S.S.; West Bengal University of Animal

and Fisheries Sciences, Kolkata (India). Comparative molecular epidemiological studies on bovine and human cryptosporidiosis. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 945-955 KEYWORDS: CRYPTOSPORIDIUM. BOVINAE. MANKIND.

Cryptosporidium is an intracellular coccidian protozoan parasite, once thought to be rare and host specific now is known to be ubiquitous in nature and infect a wide range of animals, birds, reptiles and human. The present study was carried out both on bovine and human. A total of 500 faecal samples from two different cattle farms and local Khattal, and 334 stool samples of children were collected from a hospital of Kolkata, West Bengal. Both the bovine and human samples were classified into three groups, viz. disease status (diarrhoeic and non-diarrhoeic), age and season. The overall 18% and 2.99% cryptosporidiosis was found in cattle and human samples, respectively. The prevalence of Cryptosporidium in diarrhoeic and non-diarrhoeic cattle was 22.57% and 9.10%. In human, 4.62% and 1.24% cases were found to be positive for cryptosporidiosis in diarrhoeic and non-diarrhoeic samples, respectively. Age specific distribution of Cryptosporidium both in diarrhoeic and non-diarrhoeic cattle suggested that infection was highest (15.75%) in calves (upto 1 year) and lowest (5.83%) in heifer (1–3 yrs). The prevalence was intermediate (13.95%) in lactating animals (3 years). In human, prevalence was highest (4.12%) in upto 1 year age group but lowest (1.04%) in 4–5 years of age. Seasonal prevalence revealed that infection was highest during rainy season in both bovine and human. During winter lowest prevalence was found in cattle but no positive case was observed in human. PCR-RFLP analysis and nucleotide sequencing of isolated species revealed that Cryptosporidium parvum and Cryptosporidium hominis were the species mainly responsible for diarrhoea in cattle and human, respectively. Four Cryptosporidium parvum positive cases were also detected from human diarrhoeic samples which had similar nucleotide sequences to that of Cryptosporidium parvum isolated from bovine samples. These findings suggest that the zoonotic transmission of the diseases could be possible. PCR-RFLP can be used as a potential and reliable tool for species identification of Cryptosporidium in both bovine and human.

0131. Ingale, S.L.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in Animal Nutrition. Singh, P.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in Animal Nutrition. Verma, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in Animal Nutrition. Mehra, U.R.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Advanced Faculty Training in Animal Nutrition. Effect of Fasciola gigantica Infection on Nutrient Utilization and Cytokine Gene Expression during Prepatent Period in Growing Crossbred (*Bos taurus* x *Bos indicus*) Cattle. Animal Nutrition and Feed Technology (India). (Jul 2010) v. 10(2) p. 177-185 KEYWORDS: CATTLE. CROSSBREDS. FASCIOLA GIGANTICA. FASCIOLA.

A study was undertaken to investigate the nutrient utilization and cytokine gene expression as influenced by *Fasciola gigantica* infection in crossbred male cattle during prepatent period. Fifteen male (12 months age and 184.5±6.75 kg mean body wt) were randomly divided into three groups of five animals in each group following completely randomized design. Animals in groups I and II were fed with 100 percent, whereas, group III were fed with 75% of NRC (1988) requirement. Animals in groups II and III were infected orally with a dose of 1000 metacercariae of *F. gigantica*, whereas, animals of group I served as uninfected control. Digestion cum metabolism trial of 8 days duration was conducted after 45 days post infection. The cytokine gene expression (IL-2 and IL-10) were analyzed 45 days post infection by using real-time reverse transcription polymerase chain reaction (RT-PCR) with the double stranded DNA-binding dye SYBR Green to know the T cell response during clinical phase of fasciolosis. Dry matter intake of group III was significantly ($P<0.01$) lower than groups I and II. Digestibility of ether extract of infected animals was significantly ($P<0.05$) lower than control whereas digestibility of other nutrients were not influenced due to *F. gigantica* infection. IL-10 was present in detectable levels in peripheral blood mononuclear cells (PBMCs) of infected animals, whereas in control animals IL-2 was not present in detectable levels. IL-2 was not present in detectable levels in PBMCs of both infected and control groups. It can be construed that nutrient utilization was hardly affected due to *Fasciola gigantica* infection during prepatent period and T cell response was Th2 type.

L73 Animal Diseases

0132. Sandhu, B.S.; 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. Awahan, S.; 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. Gupta, K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Veterinary Pathology. Immunohistochemistry, histopathology, quantitative morphometry of negri bodies in the brain of rabid animals. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.117-122 KEYWORDS: HISTOPATHOLOGY. RABIES. ANIMALS. FUNGAL MORPHOLOGY. BRAIN. ANTIGENS.

Direct Fluorescent Antibody Technique (dFAT) on brain impression smears and tissue sections are the routinely used techniques for the diagnosis of rabies in animals and humans. Total 38 rabies suspected cases were subjected for rabies antigen/Negri bodies detection by immunofluorescence (19), immunohistochemistry (18) and histopathology (16). Sensitivity of immunohistochemistry and histopathology in comparison to dFAT on brain tissue smears was found to be 94.74% and 84.21%, respectively. Hundred neurons per case from different sites were visualized for presence or absence of Negri bodies and number of Negri bodies was counted in each positive neuron. With IHC 58.83% neurons were found positive for Negri bodies in comparison to 47.94% with H & E. Average number of Negri bodies detected per neuron by IHC and histopathology was 2.71 and 1.94, respectively. It was concluded that IHC was a more efficient and precise technique for detecting rabies viral antigen/ Negri bodies in paraffin embedded formalin fixed tissues from rabies suspected case than conventional H& E staining.

0133. Panda, S.K.; Orissa University of Agriculture and Technology, Orissa Veterinary College, Bhubaneswar (India). Department of Veterinary Pathology. Sahu, Banamali; Orissa University of Agriculture and Technology, Orissa Veterinary College, Bhubaneswar (India). Department of Veterinary Pathology. Ranjan, Rajeev; Project Directorate on Foot Mouth Diseases, IVRI Campus, Mukteswar (India). Acharya, A.P.; Orissa University of Agriculture and Technology, Orissa Veterinary College, Bhubaneswar (India). Department of Veterinary Pathology. Rath, S.K.; Orissa University of Agriculture and Technology, Orissa Veterinary College, Bhubaneswar (India). Department of Veterinary Pathology. Prevalence and clinicopathological study of theileriosis in bovine in coastal areas of Orissa. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.128-132 KEYWORDS: ORISSA. BOVINAЕ. COASTAL AREA. THEILERIA. HISTOPATHOLOGY.

Prevalence and clinico-pathological study of theileriosis in cattle in coastal area of Orissa was carried out from 2002 to 2006. Out of 886 cases 27% and 36% were found positive in blood smear examination from coastal belt and non-coastal areas, respectively. Out of total suspected cases, 24% of the male and 27% of the female were positive. The seasonal incidence of theileriosis was 23% in rain, 35% in summer and 22% in winter. Young animals were most susceptible. On haematological examinations, the haemoglobin concentration in all the animals varied between 2.2 to 17.0 g/dl in positive cases. TEC varied from 1 million to 5.8 million/cmm of blood. Differential leucocyte count in positive samples, for neutrophils ranged between 6 to 84%, for lymphocyte ranged between 14 to 8%. Histopathologically, kidney showed degenerative changes, Bowmans space distended and bowmans capsules were thickened with fibrous hyperplasia. Liver showed fibrosis in the portal tract, disruption of hepatic cords, dissociation of hepatocytes and Kupffer cell proliferation. Lungs revealed areas of emphysema, atelectasis and thickened alveolar wall, and pneumonic changes. Lymph node were enlarged and showed severe depletion of lymphocytes. Abomasum showed necrosed foci and punched out ulcers on mucosa, cellular infiltration into lamina propria and marked oedema of the sub-mucosa and muscular layer.

0134. Shivasharanappa, N.; Central Institute for Research on Goats, Mathura (India). Singh, R.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. Singh, K.P.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. Madhu, B.P.; Indian Veterinary Research Institute, Izatnagar (India). Centre for Animal Disease Research and Diagnosis. NK cell and macrophage activity in experimentally induced rabies in mice. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.159-161 KEYWORDS: CELLS. MACROPHAGES. RABIES. MICE.

Twenty adult Swiss albino mice were intracerebrally inoculated with each 0.03ml of Challenge virus standard (CVS) strain of rabies virus. Similar amount of phosphate buffer saline was given intracerebrally to equal number of control mice. The NK cell and Macrophage profile studied by Fluorescent Activated Cell Sorting (FACS) using monoclonal antibodies revealed significantly higher activity of NK cells and macrophages in blood and spleen in rabies infected group than in control mice. All the infected mice could not survive and the lesions were characterized by infiltration of gitter cells in the hippocampus with perivascular cuffing suggesting that these cells played an important role in the pathogenesis of rabies.

0135. Gowthaman, V.; Indian Veterinary Research Institute, Izatnagar (India). Avian Diseases Section, Division of Pathology. Singh, S.D.; Indian Veterinary Research Institute, Izatnagar (India). Avian Diseases Section, Division of Pathology. Dhama, K.; Indian Veterinary Research Institute, Izatnagar (India). Avian Diseases Section, Division of Pathology. Barathidasan, R.; Indian Veterinary Research Institute, Izatnagar (India). Avian Diseases Section, Division of Pathology. Anjaneya; Indian Veterinary Research Institute, Izatnagar (India). Avian Diseases Section, Division of Pathology. Ramakrishnan, M.A.; Indian Veterinary Research Institute, Muktheswar (India). Division of Virology. Pathology and molecular diagnosis of Newcastle disease virus infection in broiler breeders. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.168-170 KEYWORDS: PATHOLOGY. DIAGNOSIS. NEWCASTLE DISEASE. NEWCASTLE DISEASE VIRUS. INFECTION. BROILER CHICKENS. PCR. HAEMAGGLUTINATION TESTS.

Newcastle disease (ND) is one of the most devastating diseases of poultry causes a fatal respiratory, enteric and neurological disease leading to almost 100% morbidity and mortality. Although, Newcastle disease virus (NDV) infections reported in many avian species and different types of chickens viz. broilers and layers, reports on NDV infections in breeders are scanty. In the current study, disease investigation was carried out in a 35-weeks-old broiler breeder flock with heavy mortality and severe respiratory disease in Bareilly district of Uttar Pradesh. Necropsy was carried out on freshly dead and ailing birds. In the virus isolation study, embryonating chicken eggs were died within 48 hours of inoculation and showed HA titer of 29. The NDV was confirmed by F gene based RT-PCR from amnio allantoic fluids samples. The present study confirms the existence of NDV infections in the breeders and emphasizes the need for developing effective vaccine programme and biosecurity measures to combat the Newcastle disease.

0136. Pramod, S.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Nair, N.D.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Litty, M.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Ambily, V. R.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Vijayan, N.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Lalithakunjamma, C.R.; KVASU, College of Veterinary and Animal Sciences, Mannuthy, Thrissur (India). Centre of Excellence in Pathology. Pathological observations in experimental pasteurellosis in Kuttanad ducks. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.189-192 KEYWORDS: DUCKS. PASTEURELLA MULTOCIDA. PATHOLOGY.

Pasteurella multocida was inoculated in one month old ducklings via two different routes – subcutaneous and intranasal. The symptoms, mortality pattern, gross and histopathological changes of the inoculated birds were

compared daily for a period of 30 days. Reisolation studies were also performed from the vital organs. The results obtained showed that the route of entry of organism played a significant role in the progression of infection, onset of mortality, number of deaths, expression of symptoms and lesions. The parenteral (subcutaneous) inoculation featured more acute pattern of infection and mortality whereas the expression of symptoms and lesions were of higher degree in intranasally inoculated birds. The immunosuppression and resultant high morbidity in duck cholera were well evidenced as there was depletion, necrosis and cystic changes in the lymphoid organs.

0137. Pandey, G.S.; University of Zambia, Lusaka (Zambia). School of Veterinary Medicine, Department of Disease Control. Mkandawire, E.; University of Zambia, Lusaka (Zambia). School of Veterinary Medicine, Department of Disease Control. Prevalence and pathology of warble fly larvae (*Strovioloestrus vanzyli*) among Kafue lechwe (*Kobus leche kafuensis*). Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.193-196 KEYWORDS: PATHOLOGY. ZAMBIA.

The Kafue lechwe (*Kobus leche kafuensis*) is a semi-aquatic antelope, endemic to Zambia and occurs in one large population on the Kafue flats of the Kafue river where cattle mingle and share the water and pasture with them during dry season for a period of about 6 months every year from May to October. Out of 177 Kafue lechwe examined for the presence of warble larvae in the subcutaneous tissues by palpation, 36 (20%) had warble fly larvae ranging from 12-194. The younger animals had more larvae than older one. The nodule was small, subcutaneous swelling containing white to cream colour warble larvae in different stages of development. Histo-pathological lesions were characterised by chronic granulomatous reaction. Mononuclear cells containing large eosinophilic granules were seen and resembled globule leucocytes. Masses of leucocytes were present in the mid gut of the larvae. No lesions or larvae could be seen in istopathological sections of spinal cord and oesophagus. Massive infestation by the larvae may result in poor and emaciated condition of the lechwe and may predispose the host to other infections.

0138. Shivasharanappa, N.; Central Institute for Research on Goats, Mathura (India). Animal Health Division. Reddy, G.B. Manjunatha; Central Institute for Research on Goats, Mathura (India). Animal Health Division. Sharma, Nitika; Central Institute for Research on Goats, Mathura (India). Animal Health Division. Gupta, V. K.; Central Institute for Research on Goats, Mathura (India). Animal Health Division. Parasitic encephalitis caused by larvae of *Oestrus ovis* in Sirohi goat. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.204-205 KEYWORDS: ENCEPHALITIS. GOATS. OESTROUS CYCLE. OESTRUS OVIS.

Oestrosis is a nasal myiasis of sheep and goats caused by the larvae of fly *Oestrus ovis*. An adult male Sirohi goat died with the history of muco-purulent nasal discharge, laboured breathing, depression and head pressing. The post-mortem examination revealed aberrant, unilateral encephalitis characterized by severe necrosis of entire left cerebral hemisphere. Infestation and recovery of the nasal bots of goats from the aberrant sites like cranial cavity and brain is unusual and rare.

0139. Lavanya, K.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Ramadevi, V.; NTR College of Veterinary Science, Gannavaram (India). Department of Veterinary Pathology. Srilatha, Ch.; College of Veterinary Science, Tirupati (India). Department of Veterinary Pathology. Pneumonia in pigs- A pathomorphological study. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.206-208 KEYWORDS: PNEUMONIA. SWINE. PATHOLOGY.

Pneumonia was noticed in 216 out of 350 pigs (61.71%) examined in the present study. In acute or chronic suppurative bronchopneumonias, the exudates were predominantly composed of neutrophils; fibrin was predominant exudates in fibrinous bronchopneumonia cases. Areas of coagulative necrosis showed accumulation of degeneration and intact polymorphs and bronchioles were filled with necrotic material. Extensive lymphoid follicular aggregates in the peribronchial, peribronchiolar and perivascular spaces along with peribronchial and perivascular fibrosis in interstitial pneumonia cases with influx of neutrophils into the alveolar lumen were noticed. The alveoli were lined by cuboidal type II pneumocytes in bronchointerstitial

pneumonia cases. Granulomatous pneumonia case was characterized by the presence of small granulomas in the lungs consisting of a foreign body in the centre and verminous pneumonia cases revealed the sections of the parasites of *Metastrongylus* sps in the lumen of the bronchioles, surrounded by mucus and inflammatory cells.

0140. Shameem, H.; College of Veterinary and Animal Sciences, Thrissur (India). Department of Veterinary Parasitology. Devada, K.; College of Veterinary and Animal Sciences, Thrissur (India). Department of Veterinary Parasitology. Mammen; College of Veterinary and Animal Sciences, Mannuthy, Thrissur (India). Department of Veterinary Parasitology. Abraham, J.; College of Veterinary and Animal Sciences, Mannuthy, Thrissur (India). Department of Veterinary Pathology. Clinicopathological effects of intestinal coccidiosis in rabbits. *Indian Journal of Veterinary Pathology* (India). (Dec 2011) v. 35(2) p.215-216 KEYWORDS: RABBITS. COCCIDIA. HISTOPATHOLOGY. QUANTITATIVE ANALYSIS. RABIES.

Study on coccidiosis conducted in rabbits in Thrissur revealed subclinical form of coccidiosis as more prevalent in commercial rabbitries while traditionally reared rabbits suffer from clinical disease. Intestinal coccidiosis is manifested by diarrhoea, soiled fur and loss of condition with 35,000 – 70,000 number of oocysts per gram of faeces. Histopathological studies revealed characteristic lesions of coccidiosis.

0141. Sawale, G.K.; Bombay Veterinary College, Mumbai (India). Mane, D. V.; Indovax Private Limited, Gurgaon, (India). Gupta, S.C.; Indovax Private Limited, Gurgaon, (India). Srivastava, P.K.; Indovax Private Limited, Gurgaon, (India). Sabale, S.S.; Indovax Private Limited, Gurgaon, (India). Ingole, K.H.; Indovax Private Limited, Gurgaon, (India). Bharkad, G.P.; Bombay Veterinary College, Mumbai (India). Department of Parasitology. More, B.K.; KNP College of Veterinary Sciences, Shirwal (India). Pneumo-encephalitic aspergillosis in broiler breeder flock. *Indian Journal of Veterinary Pathology* (India). (Dec 2011) v. 35(2) p.221-222 KEYWORDS: PNEUMONIA. ENCEPHALITIS. ASPERGILLUS. MYCOSES. BROILER CHICKENS. HERDS.

Pneumo-encephalitic aspergillosis in a broiler breeder flock having respiratory and nervous signs due to *Aspergillus fumigatus* is reported. Clinically chicks showed dyspnoea, torticollis, incoordination and stunting with mortality of 3.37 % in female chicks and 6.57 % in male chicks. On postmortem examination, white to yellow caseous nodules were observed on lungs, thoracic air sacs, and cerebellum. Histopathological examination of lungs and cerebellum revealed granulomatous inflammation and necrotic meningo-encephalitis. Fungal hyphae were observed in stained sections prepared from lungs, air sac and cerebellum. *Aspergillus fumigatus* was isolated from the lungs, brain and litter. The flock was treated successfully with copper sulphate.

0142. Rajkhowa, T.K.; Central Agricultural University, Aizawl (India). Department of Veterinary Pathology. Deka, Devajani; Central Agricultural University, Aizawl (India). Department of Veterinary Public Health & Epidemiology. Ralte, Malsawmtluangi; Central Agricultural University, Aizawl (India). Department of Veterinary Public Health & Epidemiology. Outbreak of Histomonosis with *Heterakis gallinarum* infection in a turkey farm in Aizawl, Mizoram. *Indian Journal of Veterinary Pathology* (India). (Dec 2011) v. 35(2) p.230-232 KEYWORDS: HETERAKIS GALLINARUM. HISTOMONAS. INFECTION. TURKEY. FARMS. MIZORAM.

An outbreak of histomonosis was investigated in a turkey farm comprising of total 350 birds in the age group of around 3 months at Selesih village, Aizawl, Mizoram. History of using rice husk as litter material, clinical signs of anorexia, ruffled feathers, depression and lethargy, cyanosis of head and watery greenish diarrhea with initial low grade mortality and presence of *Heterakis gallinarum* in caecal content suggested the disease. On necropsy examination on total 35 dead birds and histopathological examination confirmed the disease in the farm. The practice of mixed rearing of different poultry species or alternative poultry farming in close proximity in small scale bears the need of detailed epidemiological investigation of the disease in the state.

0143. Ram, Anitha; College of Veterinary and Animal Sciences, Thrissur (India). Centre of Excellence in Pathology. Abraham, Mammen J.; College of Veterinary and Animal Sciences, Thrissur (India). Centre of

Excellence in Pathology. Ali, Ashny; College of Veterinary and Animal Sciences, Thrissur (India). Centre of Excellence in Pathology. Vijayan, N.; College of Veterinary and Animal Sciences, Thrissur (India). Centre of Excellence in Pathology. Pramod, S.; College of Veterinary and Animal Sciences, Thrissur (India). Centre of Excellence in Pathology. Nephroblastoma in Giriraja (*Gallus domesticus*) - A case report. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.241-242 KEYWORDS: KIDNEYS.

Carcass of an year old female Giriraja brought from the University Poultry Farm, on autopsy revealed large yellow gray lobulated mass which replaced most of the right kidney tissue. Based on the histopathological examination, the tumour was diagnosed as nephroblastoma. Kidney mass revealed tubules of varying sizes lined by single to multiple layers of hyper-chromatic vesicular cells within a fairly predominant connective tissue stroma and undifferentiated glomeruli.

0144. Chopade, N.A; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Department of Veterinary Pathology. Kurkure, N. V.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Department of Veterinary Pathology. Narkhede, H. P.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Department of Veterinary Pathology. Barbuddhe, S. B.; ICAR Research complex for Goa, Ela, (India). Bhandarkar, A.G.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Department of Veterinary Pathology. Kalorey, D.R.; Maharashtra Animal and Fishery Sciences University, Nagpur (India). Department of Veterinary Pathology. Detection of *InvA* gene in isolated *Salmonella* isolates from spleen of pigs by Polymerase Chain Reaction (PCR). Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.58-60 KEYWORDS: SALMONELLA. SWINE. PCR. SPLEEN.

Nine *Salmonella* isolates (11.25%) from 80 spleen samples of pigs collected from slaughter house detected by conventional culturing when subjected to *Salmonella*-specific gene (*invA*) yielded product a 284-bp DNA fragment.

0145. Dubal, Rahman, Z.B., Pal H., Papri Kumar, Pradhan, Kalpana. Characterization and antimicrobial sensitivity of the pathogens isolated from bovine mastitis with special reference to *Escherichia coli* and *Staphylococcus* spp. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1163–67 KEYWORDS: ANTIMICROBIALS. TESTES. *ESCHERICHIA COLI*. GENETIC MARKERS. PCR. *STAPHYLOCOCCUS AUREUS*.

A study was conducted with the objective of isolation and molecular characterization of *E. coli* and *S. aureus* and identifying the efficacy of different antimicrobials against the bacteria associated with the mastitis. All the milk samples collected aseptically, tested for mastitis by California Mastitis Test (CMT), revealed 8 (27.58%) and 68 (24.63%) samples positive for subclinical mastitis from yak and cattle, respectively. *Escherichia coli* (18.18%), *Staphylococcus aureus* (42.14%), coagulase negative staphylococci (23.96%), *Streptococcus* spp. (3.30%), *Micrococcus* spp. (14.04%) and *Bacillus* spp. (5.78%) were isolated from 76 CMT positive milk samples and 45 samples from clinical cases of mastitis. *E. coli* were serotyped as O13, O132, O88, O26, O162, O88, O86 and O157. Sorbitol was not fermented by serotype O157 and it was isolated and reported for the first time from animal origin in Sikkim, India. *E. coli* O157 and O88 were positive for *stx 1* genes by Polymerase Chain Reaction (PCR). Twenty six (78.7%) isolates of *S. aureus* showed strong association of DNase and coagulase and all were untypable with the international sets of phages. It was observed by disc diffusion test that nitrofurantoin and tetracycline (97.77% each) to be most effective antimicrobial followed by chloramphenicol (95.55%) and cephalexin (91.11%) against the pathogens associated with bovine mastitis.

0146. Bajpai, U.K.; Narendra Deva University of Agriculture and Technology, Kumarganj (India). Joshi, R.K.; Narendra Deva University of Agriculture and Technology, Kumarganj (India). Joshi, Namita; Narendra Deva University of Agriculture and Technology, Kumarganj (India). Isolation and characterization of a field isolate of infectious bursal disease virus in BGM-70 cells. Indian Journal of Animal Sciences (India). (Dec 2010) v. 80(12) p. 1179–81 KEYWORDS: IMMUNOFLUORESCENCE. GUMBORO DISEASE. INFECTIOUS BURSAL DISEASE VIRUS.

0147. Kanwar, P.; CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur (India). Sharma, M.; CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur (India). Dhar, P.; CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur (India). Katoch, V.; CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur (India). Asrani, R.K.; CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur (India). Physicochemical characterization of fowl adenovirus serotype 4 isolate from Himachal Pradesh. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 719-720 KEYWORDS: POULTRY. AVIPOXVIRUS. HIMACHAL PRADESH.

Physicochemical characterization of FAV-4 isolate recovered from natural outbreak of Hydropericardium syndrome in poultry in Himachal Pradesh was done. FAV-4 virus was inactivated at 56°C for 1 h, 60°C for 1 h, 80°C for 10 min and 100°C for 5 min. The virus was not found to be sensitive to the different pH ranges (pH 3 to pH 10) and lipolytic agents, viz. ether and chloroform.

0148. Singh, V.; Indian Veterinary Research Institute, Izatnagar (India). Somvanshi, R.; Indian Veterinary Research Institute, Izatnagar (India). BPV-2 associated papillomatosis in Indian water buffaloes. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 956-960 KEYWORDS: WATER BUFFALOES. BOVINE PAPILOMAVIRUS.

Twenty cases of cutaneous warts (CWs) were recorded. Grossly and microscopically these were similar to those described in cattle as cauliflower-like or dome shaped and diagnosed as fibropapilloma/papilloma. These were characterized by presence of koilocytes, keratohyaline granules and inclusion bodies. BPV-like particles were demonstrated by negative staining and transmission electron microscopy (TEM). BPV-2 was detected from CWs by PCR and confirmed by nucleotide sequencing and phylogenetic analysis. CWs were successfully transmitted to hamsters, cattle and buffaloes. Lesions produced in hamsters were early fibromatosis to fibromas and those in cattle and buffaloes were identical to those in natural cases. This is the first confirmed report of BPV-2 associated papillomatosis in Indian water buffaloes and its transmission.

0149. Karunakaran, S.; Veterinary Clinical Lab, Palakkad (India). Krishnan Nair, G.; College of Veterinary and Animal Sciences, Thrissur (India). Divakaran Nair, N.; College of Veterinary and Animal Sciences, Thrissur (India). Mini, M.; College of Veterinary and Animal Sciences, Wayanad (India). Systemic Aspergillosis in Emu Chicks in an organised farm in Kerala. Veterinary World (India). (Oct 2010) v. 3(10) p. 453-455 KEYWORDS: CHICKS. ASPERGILLUS. MYCOSES.

Systematic post mortem examination was carried out on seven Emu chicks submitted for disease diagnosis to Clinical Laboratory, District Veterinary Centre, Palakkad. On examination, numerous small greyish white nodules were seen in the lungs, air sacs, kidney and serosal surface of proventriculus. Dark red liver with necrotic areas and dark coloured spleen were the other lesions. Microscopically the lungs revealed granulomas with central areas of caseation surrounded by mononuclear cells and fibroblasts. PAS positive fungal hyphae could be seen in the lesion. Aspergillus fumigatus could be isolated in Sabouraud Dextrose Agar from the lesions. This is the first report on the occurrence of system.

0150. Vagh, A.A.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Medicine. Jani, R.G.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Medicine. Prevalence and Comparative Studies of Some Major Serotype of E.Coli from Cattle and Buffalo Calf Scour. Veterinary World (India). (Oct 2010) v. 3(10) p. 458-459 KEYWORDS: CALVES. ESCHERICHIA COLI. MORBIDITY. SEROTYPES.

A study was carried out to find the different serotype of E.coli isolates from the young cattle and buffalo calves affected with calf scours. Different strains of E. coli were isolated from 30 cases of calf scour from both cattle and buffalo calves each. All the isolates of E. coli were typed for O antigen. The relationship of serotypes

of E. coli to each case showed that two of the twenty six serotypes were common and appeared most virulent in both the species.

0151. Roy, Ashish; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Microbiology Pankaj Kumar; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Microbiology. Bhandari, B.B.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Microbiology. Detection of Mycoplasma Capri antibodies in goats of Gujarat state. Veterinary World (India). (Oct 2010) v. 3(10) p. 471-472 KEYWORDS: GOATS. MYCOPLASMA. DIAGNOSIS. MYCOPLASMA MYCOIDES.

200 serum samples were collected from apparently healthy goats of different age and sex from Anand, Navsari and Valsad districts of Gujarat (India). , were screened for mycoplasmal antibodies by slide agglutination test using colored antigen of Mycoplasma mycoides subsp. capri. Out of 200 serum samples screened 85 were found to be positive indicating overall seroprevalence of 42.50 percent. The higher prevalence was observed in Navsari district (66.66 %) followed by Valsad (60.66%) and Anand district (32.85 %). The higher incidence in these districts could be suggesting the endemicity of the disease. Slide agglutination test for mycoplasmal antibodies detection using colored antigen of Mycoplasma mycoides subsp. capri. antigen was found to be quick, simple, low cost with ease of application in the field without the need of any specialized training and equipments.

0152. Sonar, S. S.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Public Health. Brahmbhatt, M.N.; Anand Agricultural University, Anand (India). College of Veterinary Science and Animal Husbandry. Department of Veterinary Public Health. Toxoplasmosis: An Important Protozoan Zoonosis. Veterinary World (India). (Oct 2010) v. 3(10) p. 481-484 KEYWORDS: ZOONOSES. TOXOPLASMOSIS.

Toxoplasmosis is an important infection caused by single celled parasite Toxoplasma gondii which is one of the world's most common parasites. Toxoplasmosis is considered to be the third leading cause of death attributed to food-borne illness in the United States. Most people affected never develop signs and symptoms. But for infants born to infected mothers and for people with compromised immune systems, toxoplasmosis can cause extremely serious complications. Toxoplasmosis was first described in 1908 from a small rodent. The parasite infects almost all warm blooded animals and serological evidence indicates that it is one of the most common of humans infections throughout the world. The disease is transmitted mainly by ingestion of infective stage of the parasite, organ transplant as well as blood transfusion in addition to the transplacental transmission which is very common. Toxoplasmosis can be presented in various forms of clinical manifestations depending on the immune status of the patient causing life threatening disease in AIDS patient. Pregnant women, cat owners, veterinarians, abattoir workers, children, cooks, butchers are considered as high risk group. Timely treatment of man and animals with proper antibiotic, hygienic measures, proper disinfection, mass education and vaccination are the measures to curtail the disease.

L74 Miscellaneous Animal Disorders

0153. Deshmukh, S.; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Pathology. Banga, H.S.; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Pathology. Kwatra, K.S.; Mohan Dai Oswal Cancer Treatment and Research Foundation, Ludhiana (India). Department of Pathology. Singh, N.D.; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Pathology. Gadhawe, P.D.; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Pathology. Kumar, Ashwani; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Surgery and Radiology. Brar, R.S.; GADVASU, College of Veterinary Science, Ludhiana (India). Department of Veterinary Pathology. Immuno-histochemical study on a

rare case of hepatic carcino-sarcoma in an Indian water buffalo (*Bubalus bubalis*). Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.123-127 KEYWORDS: HEPATITIS. WATER. LIVER. WATER BUFFALOES.

A rare case of hepatic tumour from a buffalo having heterogeneous appearance of epithelial and mesenchymal component(s) in hepatic parenchyma with exhilarating metastasis to lungs is reported. The gross lesions includes distorted yellowish, white multiple thickened nodular mass of variable sizes, with minimal central necrotic areas either in liver and lungs. Histologically, spindle shaped cells within irregular fibrous trabecular network, intermingled with scanty amount of epithelial or mesenchymal component(s) along with infiltration at tumour and non tumour boundary was observed. The tumour cells in liver reacted positively with pan-cytokeratin (pCK), polyclonal carcinoembryonic antigen (pCEA) and vimentin (VM), while focal positivity to cytokeratin7 (CK7) in liver and locally scattered immunoreactivity to cytokeratin7 (CK7) in lungs was appreciated, which indicated the sarcomatoid transformation of carcinomatous feature of neoplasm in liver. Ki-67 immunostaining exhibited high proliferative index. The periodic acid Schiff (PAS) and Massons Trichome staining exhibited the mucinous and fibrous contents of tumour respectively at different sites.

0154. Ranganath, G.J.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Kumar, Ram; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Reddy, A.P. Vishwanatha; Indian Veterinary Research Institute, Izatnagar (India). Division of Biochemistry. Mayilkumar, K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Pawaiya, R. V. S.; CIRG, Makhdoom, Mathura (India). Debroy, Biplab; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Expression pattern of c-erbB2 and estrogen receptor- α in spontaneous canine mammary tumours. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.136-141 KEYWORDS: DOGS. MAMMARY GLANDS.

C-erbB2 and ER α are implicated in carcinogenesis of mammary gland and reproductive tumours. In the present study, expression pattern of c-erbB2 and ER α was investigated in different histological subtypes of spontaneous canine mammary tumour samples by immunohistochemistry (n=103). The pattern of expression of c-erbB2 and ER α was correlated semi-quantitatively with respect to histological subtypes. C-erbB2 overexpression was seen in both membrane and cytoplasm of transformed cells. 33.9% of tumours overexpressed c-erbB2 and its expression was exclusively limited to malignant epithelial tumours. C-erbB2 expression was significantly higher in solid carcinomas; however there was no significant difference between other histological subtypes. ER α expression was found in the nucleus of normal and neoplastic epithelial and myoepithelial cells. 79.6 % of tumours reacted positively for ER α . Simple adenoma had significantly higher levels of ER α expression compared to malignant tumours (P=0.05). Among malignant tumours solid carcinomas and carcinosarcoma had significantly lower ER α expression. However, there was no significant difference in ER α expression between tubular adenocarcinoma papillary adenocarcinoma and malignant mixed tumours. Further, c-erbB2 overexpression was associated either with ER \pm negativity or its lower expression (P = 0.01). These findings suggest that overexpression of c-erbB2 and loss of ER α expression associated with malignant transformation and higher degree of malignancy.

0155. Rajmani, R.S.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Doley, J.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Singh, P.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Kumar, Ravi; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Barathidasan, R.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Kumar, Pawan; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Verma, P.C.; Indian Veterinary Research Institute, Izatnagar (India). Division of Standardization. Tiwari, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Induction of mammary gland tumour in rats using N-methyl-N-nitroso urea and their histopathology. Indian Journal of Veterinary

Pathology (India). (Dec 2011) v. 35(2) p.142-146 KEYWORDS: MAMMARY GLANDS. CYTOKINES. RATS. NITROSOUREA. HISTOPATHOLOGY. ADENOMA.

The incidence of Breast cancer among women is increasing day by day in developing countries. It remains a challenge to biologist. Over the past two decades murine model of mammary cancer provided greater insights into derangements of molecular mechanisms that lead to cancer. Murine models offer a tremendous opportunity to identify such molecular network and their correlation with women breast cancer. These models are used to investigate the factors involved in malignant transformation, invasion and metastasis as well as to examine the response to therapy. Chemical carcinogen induced tumour model has a number of features that make it particularly attractive to study the biology of mammary cancer and for developing and evaluating cancer prevention strategies. N-methyl N-Nitroso Urea (MNU) is in general hormone dependent carcinogenic chemical. In the present investigation N-methyl N-Nitroso Urea (sigma Aldrich, USA) was used for the induction of mammary tumour in female Sprague dawley rats for the study of breast cancer development and histopathological study along with environmental effect on induction of tumour. 35.55% (32/90) of rats were developed mammary tumour after 20 to 25 weeks of first injection of MNU, which is significantly low as reported by other researcher.

0156. Sarkar, T.K.; Sher-e-Kashmir University of Agricultural Sciences and Technology, Ganderbal (India). Cattle Research Station. U. Dimri; Indian Veterinary Research Institute, Izatnagar (India). Division of Medicine. Sharma M.C.; Indian Veterinary Research Institute, Izatnagar (India). Division of Medicine. Sharma, Rinku; IVRI Regional Station Palampur, (India). Somvanshi, R.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Toxicopathological studies of ethanolic extract of *Asparagus racemosus* wild and *Terminalia chebula* retz in rats. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.162-167 KEYWORDS: TOXICOLOGY. PATHOLOGY. EXTRACTS. WILD ANIMALS. TERMINALIA. RATS. ASPARAGUS. HERBACEOUS PLANTS.

A study was conducted to standardize the dose of immunomodulatory and antioxidant potential herbs viz. *Asparagus racemosus* (AR) and *Terminalia chebula* (TC) on rat model. The ethanolic extract of AR roots and TC kernel were provided to different groups of rats 250 mg, 500 mg and 1000 mg/kg b. wt, respectively on alternate days for 4 weeks. There was no mortality of rats with any dose of herbal extracts. Significant ($P < 0.01$) increase in body mass was observed in AR 250 mg dose group (115.36%) and TC 250 mg dose group (114.63%) as compared with healthy control (108.74%) whereas, significant ($P < 0.01$) decrease in body mass was noticed in TC 1000 mg dose group (102.51%) rats. No significant alteration of behaviour in respect with spontaneous motor activity and forced locomotor activity was detected. Gross observations of liver and kidney in all doses were normal except the high dose (1000 mg/kg b. wt) of *Terminalia chebula* extract where there was mild yellowish discolouration of liver. The histopathological observations of rat liver and kidney of *Asparagus racemosus* 250 mg dose and *Terminalia chebula* 250 mg groups were apparently normal whereas, the liver and kidney of 500 mg and 1000 mg doses of both herbal extracts showed degenerative changes or pathological alterations. The alterations in Hb, TLC, TEC and DLC and biochemical parameters were within the normal ranges. So, the 250 mg dose of both herbs was safe for further use in rats.

0157. Kalavathi, S.; College of Veterinary Science, Rajendranagar, Hyderabad (India). Department of Pathology. Kumar, A. Anand; College of Veterinary Science, Rajendranagar, Hyderabad (India). Department of Pathology. Reddy, A. Gopala; College of Veterinary Science, Rajendranagar, Hyderabad (India). Department of Pathology. Srilatha, Ch.; Sri Venkateswara Veterinary University, Tirupati (India). Reddy, A. Rajasekhar; College of Veterinary Science, Korutla (India). Sodium arsenite toxicity in broiler chicks and its amelioration: haemato-biochemical and pathological studies. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.171-176 KEYWORDS: SODIUM. TOXICITY. BROILER CHICKENS. PATHOLOGY. ASCORBIC ACID. HISTOPATHOLOGY. VITAMIN E.

Day old broiler chicks (Vencobb strain) were divided into 6 groups of 18 birds each and maintained for 6 weeks. Group I: basal diet, Group II: basal diet + Sodium arsenite (150 ppm), Group III: basal diet + Ascorbic

acid (200 ppm), Group IV: basal diet + Vitamin-E (300 ppm), Group V: basal diet + Sodium arsenite (150 ppm) + Ascorbic acid (200 ppm) and Group VI: basal diet + Sodium arsenite (150 ppm) + Vitamin- E (300 ppm). Feeding of sodium arsenite 150 ppm resulted in significant (p 0.05) reduction in the body weights, feed consumption and increase in FCR. The overall mean values of Hb, PCV, TEC, TLC, total protein, albumin and globulin were significantly (p 0.05) reduced, while significant (P<0.05) increase in A/G ratio, AST, creatinine and GGT was observed in group II in comparison to other groups. Grossly, group II birds revealed ecchymotic haemorrhages in heart, congestion and haemorrhages in liver, congested intestinal mucosa, kidneys were swollen, spleen was regressed and haemorrhagic. Histologically, group II birds revealed disruption of cardiac muscle bundles, sinusoidal congestion, fatty change, focal areas of lymphoid aggregation, fibrous tissue proliferation around the central vein, disrupted villi tips, sub mucosal congestion, inter and intra tubular haemorrhages, congestion, infiltration of mononuclear cells in kidney, depletion of lymphocytes and haemorrhages in spleen and depletion of lymphocytes and cystic spaces were observed in bursa of Fabricius. In amelioration groups, significant improvement in all the above parameters in comparison to group II was noted. By correlating the haematological, biochemical profiles and histological changes, sodium arsenite at 150ppm showed significant toxic effects and ascorbic acid 200 ppm and vitamin-E 300 ppm in feed were effective in counteracting the toxic effects of arsenic in broiler chicken.

0158. Arulmozhi, A.; Veterinary College and Research Institute, Namakkal (India). Department of Veterinary Pathology. Varghese, Koshy; College of Veterinary and Animal Sciences, Mannuthy (India). Centre of Excellence in Pathology. Aflatoxin B1 induced pathomorphological changes in lymphoid organs of broilers. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.177-179 KEYWORDS: AFLATOXINS. BROILER CHICKENS. LIVER. SPLEEN. THYMUS (GENUS).

The present study reports the pathomorphological changes in lymphoid organs induced by aflatoxicosis in broiler chicken. One hundred and eighty day-old broiler chicks were obtained and divided into six groups of thirty birds each (Group I, II, III, IV, V and VI) and they were given 0, 20, 40, 60, 80 and 100 ppb of AFB1 respectively. Severe lymphoid depletion along with decreased bursa weight was recorded in Group IV, V and VI. Splenic atrophy and lymphoid depletion was noticed in all the groups except in Group V and VI on 45th day. Thymus revealed lymphoid depletion in all the groups throughout the experimental period.

0159. Dhanalakshmi, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Ganguly, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Fish Processing Technology. Pal, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Biochemistry. Singh, Y.D.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Pradhan, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Patra, N.C.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Kalai, K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Pandit, S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Parasitology. Mukhopadhyay, S.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Department of Veterinary Pathology. Investigation on experimentally induced Ochratoxicosis and effect of *Picrorrhiza kurroa* on pathology and immune response in broilers. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.180-183 KEYWORDS: EXPERIMENTATION. BROILER CHICKENS. PATHOLOGY.

In the present experiment, 90 day old male broiler chicks were divided into six treatment groups of 15 birds each. The humoral immune status, adjudged by hemagglutination inhibition (HI) titer (log₂ value) against Newcastle disease virus at 35 day of age revealed a significant reduction in the humoral antibody level in ochratoxin A (OA) 1 and 2 ppm treated groups and significant increase in the immune level in *Picrorrhiza kurroa* (PK) treated T₃ and T₄ groups. The percent organ weight at 35 day of age of bursa, thymus and spleen were not altered, however, slight reversal of increased liver and kidney weights were observed. Histologically, kidneys

revealed swollen epithelial cells of proximal convoluted tubules, loss of brush border, necrosis, formation of casts in the lumen of the tubules, liver revealed degenerative changes, bile duct proliferation, focal lymphoid aggregation and the lymphoid organs revealed congestion, hemorrhages, sparse aggregation of cells and lymphocytolytic activity in OA treated birds at 35th day of age. In groups T₃ and T₄ also the lesions of similar intensity were noticed which indicated the failure of PK to show the counteracting effect at cellular level at this dose rate.

0160. Vala, K.B.; Navsari Agricultural University, Navsari (India). College of Veterinary Science & Animal Husbandry, Department of Animal Reproduction, Gynaecology & Obstetrics. Panchal, M.T.; Navsari Agricultural University, Navsari (India). College of Veterinary Science & Animal Husbandry, Department of Animal Reproduction, Gynaecology & Obstetrics. Ghodasara, D.J.; Anand Agricultural University, Anand (India). College of Veterinary Science & Animal Husbandry, Department of Veterinary Pathology. Hadiya, K.K.; Navsari Agricultural University, Navsari (India). College of Veterinary Science & Animal Husbandry, Department of Animal Reproduction, Gynaecology & Obstetrics. Trangadia, B.J.; Navsari Agricultural University, Navsari (India). College of Veterinary Science & Animal Husbandry, Department of Animal Reproduction, Gynaecology & Obstetrics. Vagh, A.A.; Navsari Agricultural University, Navsari (India). College of Veterinary Science & Animal Husbandry, Department of Animal Reproduction, Gynaecology & Obstetrics. Study on histopathological changes in genitalia of culled buffaloes (*Bubalus bubalis*). Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.197-199 KEYWORDS: WATER BUFFALOES. ENDOMETRITIS. GUJARAT.

The present work was undertaken to assess the extent of histopathological changes in genital organs of culled buffaloes. Out of a total of 131 genital organs of freshly slaughtered buffaloes examined at slaughter house in Anand, Gujarat, forty tissue samples were collected from grossly affected uterine horns (n=26) and fallopian tubes (n=14) in 10 per cent neutral buffered formalin for histopathology. The histological lesions of endometritis were observed in 19.85 per cent uterine tissues. These lesions were classified into an acute (15.38%), subacute (15.38%) and chronic (69.24%) endometritis on the basis of histopathological findings. One each case of endometriosis and leiomyoma was also observed. Mild, moderate and severe degree of salpingitis were found in 14.29%, 21.43% and 64.29% tissues, respectively from examination of 14 fallopian tubes. The present findings suggest that significant numbers of cases of mild to moderate reproductive tract abnormalities are diagnosed by histopathological examination; otherwise these may be misdiagnosed by clinician on per rectal examination.

0161. Ali, Ashny; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Nair, N.D.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Anitha, R.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Vijayan, N.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Centre of Excellence in Pathology. Pramod, S.; KVASU, College of Veterinary and Animal Sciences, Mannuthy, Thrissur (India). Centre of Excellence in Pathology. Firdouz, D.; KVASU, College of Veterinary and Animal Sciences, Mannuthy, Thrissur (India). Department of Veterinary Anatomy. Papillary cystic cholangiocellular carcinoma in buffalo (*Bubalus bubalis*) - A case report. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.200-201 KEYWORDS: WATER BUFFALOES. LIVER. CYSTICERCOSIS.

An eleven years old she buffalo on necropsy exhibited white circumscribed umbilicated masses embedded beneath the capsule of the liver. A large hard solitary tumour mass was found attached to the visceral peritoneum. The case was diagnosed as papillary cystic cholangiocellular carcinoma based on identifying a malignant epithelial neoplasm with glandular pattern having characteristic of bile duct epithelium on histopathological examination.

0162. Deshmukh, G.R.; Aptus Biosciences Private Limited, Mahabubnagar (India). Kalge, R.S.; Maharashtra Animal & Fishery Sciences University, Parbhani (India). College of Veterinary & Animal Sciences, Department of Veterinary Pathology. Kulkarni, G.B.; Maharashtra Animal & Fishery Sciences University, Parbhani (India). College of Veterinary & Animal Sciences, Department of Veterinary Pathology. Gangane, G.R.; Maharashtra Animal & Fishery Sciences University, Parbhani (India). College of Veterinary & Animal Sciences, Department of Veterinary Pathology. Biradar, B.P.; Maharashtra Animal & Fishery Sciences University, Parbhani (India). College of Veterinary & Animal Sciences, Department of Veterinary Pathology. Pulmonary blastomycosis in a sheep. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.202-203 KEYWORDS: DERMATITIS. SHEEP. RESPIRATORY DISEASES.

Blastomycosis is an infectious disease of man and animals caused by the fungus *Blastomyces dermatitidis*. Diagnosis of blastomycosis was done by microscopic examination. The present paper deals with a case of pulmonary blastomycosis in a three year old female sheep.

0163. Pramod, S.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Nair, N.D.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Anju, A.J.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Ali, Ashny; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Vijayan, N.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Lalithakunjamma, C.R.; Kerala Veterinary and Animal Sciences University, Thrissur (India). College of Veterinary and Animal Sciences, Department of Veterinary Pathology. Papillary cystic cholangio cellular carcinoma in a dog with metastasis in the bronchial lymph node. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.209-210 KEYWORDS: DOGS. LYMPH. CARCINOMA. CELLS.

Papillary cystic cholangio cellular carcinoma encountered in a dog appeared as firm, white and nodular mass in general except for cystic dilatation in some areas. Bronchial lymph node was enlarged to the extent, that it was pressing and constricting the posterior trachea. Histopathologically, well differentiated glandular structures lined by the neoplastic columnar cells resembling normal biliary epithelium were noticed. The stromal reaction was marked. The metastasis in the bronchial lymph node resembled the primary hepatic lesion.

0164. Lokesh, J. V.; Indian Veterinary Research Institute, Izatnagar, Bareilly (India). Referral Veterinary Polyclinic. Kurade, N.P.; Indian Veterinary Research Institute, Izatnagar, Bareilly (India). Referral Veterinary Polyclinic. Shivakumar, M.U.; Indian Veterinary Research Institute, Izatnagar, Bareilly (India). Referral Veterinary Polyclinic. Maiti, S.K.; Indian Veterinary Research Institute, Izatnagar, Bareilly (India). Referral Veterinary Polyclinic. Multiple primary tumours in bitch – A case report. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.211-212 KEYWORDS: CYTOKINES. DOGS. FIBROMA. MAMMARY GLANDS.

An 11 year old Rampur hound bitch was presented with multiple primary tumours at thigh and mammary gland. The tumours were histopathologically diagnosed as fibroma and complex adenocarcinoma of thigh and mammary gland respectively.

0165. Prasad, M.C.; Jai Research Foundation, Vapi (India). Pathology Section, Department of Toxicology. Brahmkar, M.G.; Jai Research Foundation, Vapi (India). Pathology Section, Department of Toxicology. Lonkar, P.S.; Jai Research Foundation, Vapi (India). Pathology Section, Department of Toxicology. Kapurkar, U.M.; Jai Research Foundation, Vapi (India). Pathology Section, Department of Toxicology. Adak, A.; Jai Research Foundation, Vapi (India). Pathology Section, Department of Toxicology. Pathology of chronic interstitial pancreatitis in Beagle dogs. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.213-214 KEYWORDS: PATHOLOGY. CHRONIC COURSE. PANCREATITIS. DOGS.

Three cases (male-2 and female-1) of chronic interstitial pancreatitis were recorded in 6-12 months old Beagle dogs out of 178 necropsies. Grossly, the pancreas was hard, grayish pale in color and smaller in size when compared with pancreas of other dogs of same age group. Histomorphology revealed dense fibrous capsule. Pancreatic parenchyma was divided / subdivided into small lobes and lobules by thick fibrous septae. In addition, acinar atrophy and degeneration/necrosis, mononuclear cell infiltration, hyperplasia of interlobular ducts and periductal fibrosis with ductectasis. Islets of Langerhans appeared uninvolved.

0166. Rajmani, R.S.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Doley, J.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Singh, P.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Kumar, Ravi; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Biotechnology. Singh, R.; Indian Veterinary Research Institute, Izatnagar (India). Pathology Laboratory, CADRAD. Barathidasan, R.; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Kumar, Pawan; Indian Veterinary Research Institute, Izatnagar (India). Division of Pathology. Verma, P.C.; Indian Veterinary Research Institute, Izatnagar (India). Division of Standardization. Tiwari, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Standardization. Induction of skin tumour using DMBA in wistar Rat and histopathological evaluation. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.217-220 KEYWORDS: SKIN. SKIN DISEASES. CYTOKINES. WISTERIA. RATS. HISTOPATHOLOGY. EVALUATION.

In the present study, skin tumours in male wistar rats were induced experimentally by employing 1% DMBA (7, 12 -Dimethylbenz (a) anthracene) (2.5mg DMBA in 0.25ml of acetone to each rat) for evaluation and validation of new anticancer therapeutic modules. All the rats developed squamous cell carcinomas in 20 to 25 weeks as confirmed by histopathology, mitotic index, AgNOR staining and PCNA staining of tumour tissues.

0167. Sawale, G.K.; Bombay Veterinary College, Mumbai (India). Department of Pathology. Mane, D. V.; Indovax Private Limited, Gurgaon, (India). Gupta, S.C.; Indovax Private Limited, Gurgaon, (India). Srivastava, P.K.; Indovax Private Limited, Gurgaon, (India). Sabale, S.S.; Bombay Veterinary College, Mumbai (India). Department of Pathology. Bharkad, G.P.; Bombay Veterinary College, Mumbai (India). Department of Parasitology. More, B.K.; Indovax Private Limited, Gurgaon, (India). Occurrence of histomoniasis in free range village chicken. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.223-224 KEYWORDS: HISTOMONAS. PROTOZOAL INFECTIONS. CHICKENS.

The histomoniasis was diagnosed as a cause of death in two desi village chicken of two month age along with three ailing birds. All these birds were reared in free range system. Clinically, ailing birds showed dullness, in appetite and lethargy. Necropsy of the dead birds showed numerous circular, grey punched out foci ranging from 1-2 cm in diameter in liver and diphtheritic typhlitis. Microscopically, section of liver showed multiple confluent areas of coagulative necrosis with large numbers of individual or clustered eosinophilic rounded up parasites in clear vacuoles with sparse infiltration of lymphocytes, mononuclear cells and heterophils. The liver sections were stained with PAS and Gomoris silver methanamine stain to confirm the parasite.

0168. Acharya, A.K.; Orissa University of Agriculture & Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Veterinary Pathology. Panda, S.K.; Orissa University of Agriculture & Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Veterinary Pathology. Acharya, A.P.; Orissa University of Agriculture & Technology, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry, Department of Veterinary Pathology. Incidence and pathology of aflatoxicosis in ducks of Orissa. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.233-235 KEYWORDS: AFLATOXINS. DUCKS. POSTMORTEM EXAMINATION.

Ducks are highly susceptible to aflatoxin. Aflatoxicosis constitutes 20% of all deaths and more common in ducklings of 3-8 week age group. The present study describes the gross and histopathological changes in liver

and kidney in ducks with aflatoxicosis. Congestion and haemorrhages in the liver with soft and friable consistency was the predominant gross lesion. Enlargement of the kidney with congestion and reticulation was also seen. Microscopically, liver showed severe fatty change, necrosis, perilobular fibrocytic proliferation and biliary hyperplasia. Kidney revealed degeneration and atrophy of glomeruli.

0169. Singh, S.D.; Indian Veterinary Research Institute, Izatnagar (India). Avian Disease Section, Division of Pathology. Fibrosarcoma in a racing pigeon (*Columba livia*). Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.236-237 KEYWORDS: PIGEONS.

A hard nodular growth measuring about 2.5 cm in diameter was present at the throat region of an adult racing pigeon. Upon microscopic examination of tissue sections from the biopsy material collected in 10 per cent formalin, revealed a case of fibrosarcoma which might have resulted due to constant irritation of the part that might have attributed for the neoplastic growth.

0170. Biju, P.; Veterinary Dispensary, Kottayam (India). Epitheliogenesis imperfecta in a day old pig. Indian Journal of Veterinary Pathology (India). (Dec 2011) v. 35(2) p.243 KEYWORDS: SWINE.

One day old piglet showed anomaly of missing skin at the sites of abdomen and limbs. The case was diagnosed as epitheliogenesis imperfecta.

0171. Bhattacharyya, H. K.; Sher e Kashmir University of Agricultural Sciences and Technology-Kashmir, Srinagar (India). Faculty of Veterinary Sciences and Animal Husbandry. Khan, M. Z.; Sher e Kashmir University of Agricultural Sciences and Technology-Kashmir, Srinagar (India). Faculty of Veterinary Sciences and Animal Husbandry. Bhatt, F. A.; Sher e Kashmir University of Agricultural Sciences and Technology-Kashmir, Srinagar (India). Faculty of Veterinary Sciences and Animal Husbandry. Prevalence and management of ovulatory disturbances in cross-bred cattle. Indian Journal of Veterinary Research (India). (Jul-Dec 2011) v. 20(2) p.9-14 KEYWORDS: CROSSBREDS. CROSSBREEDING. CATTLE. MANAGEMENT. OVULE CULTURE.

Prevalence and management of ovulatory disturbances was recorded from 454 repeat breeding crossbred Jersey cattle of Kashmir valley during a 7 years period (2004-05 to 2010-11). Prevalence of anovulation and delayed ovulation was recorded 16.30 and 12.78% with an overall prevalence of 29.07% ovulatory disturbances. Anovulatory animals treated with RCG (Chorulon 1500 to 3000 IV i. v. per animal depending on body weight) showed conception rate (CR) of 86.36%; while those treated with Buserelin (Receptal 5ml L v. per animal) as 100.00%, although this difference was statistically non-significant. Animals suffering from delayed ovulation inseminated twice, thrice or 4th times depending on the persistence of estrus signs showed overall CR of 87.93%.

0172. Singh, Gyan; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Chander; Suresh; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Pandey, A.K.; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Dutt, Ravi; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (India). Distribution pattern of reproductive disorders in bovines-Clinical report. Indian Journal of Veterinary Research (India). (Jul Dec 2011) v. 20(2) p.29-31 KEYWORDS: WATER BUFFALOES. CATTLE. DYSTOCIA. REPRODUCTIVE DISORDERS.

The present report was based on analysis of 410 cases (300 buffaloes and 110cattle) of reproductive disorders. Buffaloes (300 cases) constituted the major number of the total cases followed by cows (110 cases). Dystocia cases were the major obstetrical problem in buffaloes and cattle constituted 77 and 40 per cent, respectively.

0173. Mohindroo, J.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Singh, Kiranjeet; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Ashwani Kumar; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Randhawa, C. S.; Guru Angad

Dev Veterinary and Animal Sciences University, Ludhiana (India). Clinical, haematobiochemical, radiographic and ultrasonographic features of traumatic reticuloperitonitis in bovines. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 608-612 KEYWORDS: BOVINAE. PERITONITIS. RADIOGRAPHY. ULTRASONICS. ECHOGRAPHY.

Study was conducted to compare the clinical, haematobiochemical, radiographic and ultrasonographic features of traumatic reticuloperitonitis in bovines. Clinical cases (4 cows and 17 buffaloes) presented with a history of anorexia, fever, decreased milk yield and loss of defecation/scant faeces, were used. Haematological picture revealed neutrophilic leucocytosis with left shift and blood biochemical status showed elevated levels of total protein, albumin, and fibrinogen. Decreased plasma concentration of sodium, potassium and chloride was observed in majority of the cases. Radiographic examination revealed presence of multiple metallic foreign densities in the reticulum of the bovines. Ultrasonographically, morphological changes of reticular wall and reticulophrenic adhesions in cases of localised peritonitis were visualized. The presence of anechoic fluid without echogenic margins not restricted to reticulum and sometimes with floating fibrinous shreds was observed in cases of diffuse peritonitis. Ultrasonography in B mode and B+ mode found helpful for the diagnosis of traumatic reticuloperitonitis and differentiation of localised peritonitis from diffuse peritonitis.

0174. Harendra Kumar; (Indian Veterinary Research Institute, Izatnagar (India). Neeru Bhooshan; Indian Veterinary Research Institute, Izatnagar (India). Patra, M.K.; Indian Veterinary Research Institute, Izatnagar (India). Yadav, M.C.; Indian Veterinary Research Institute, Izatnagar (India). Treatment with progestagen and PMSG to prevent prolonged anestrus in buffaloes. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 623-625 KEYWORDS: WATER BUFFALOES. OESTROUS CYCLE. PMSG. PROGESTOGENS. INDUCED OVULATION.

The trial was conducted under field conditions to study the effectiveness of a treatment with progestagen in combination with PMSG on estrus induction, prevention of prolonged anestrus and fertility in noncycling buffaloes. Non cycling buffaloes (72) with average of 120 ± 17.6 days postpartum were randomly allotted to one of the following treatments: progestagen + PMSG (n =44), 250 mg of P Depot im daily for 5 days and 500 iu folligon on seventh day of initiation of treatment and control group (CG, n = 28) without hormonal treatment. The progestagen + PMSG group showed higher estrus and synchronization rates (59.1 and 36.4%) than CG (14.28 and 3.5%). Buffaloes receiving progestagen + PMSG had higher overall pregnancy rate than CG (45.5 vs 14.28%, respectively). The treatment-first service period and calving– conception interval was shorter in hormonal treated (8.8 ± 2.5 and 192.5 ± 16.8 days) than CG (25.2 ± 3.3 and 238.9 ± 24.7 days), respectively. In conclusion, treatment with progestagen + PMSG at 120 days postpartum was effective to induce estrus, prevent prolonged anestrus and reduce the calving-conception interval, improving reproductive performance in buffaloes.

0175. Dhindsa, S.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Dhaliwal, G.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Ghuman, S.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prevention of uterine adhesion formation following caesarean section in bovines. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 626-628 KEYWORDS: BOVINAE. PARTURITION COMPLICATIONS. DYSTOCIA. CAESAREAN SECTION. UTERINE TORSION.

The present study was planned in 41 dystocia affected bovines to assess the comparative efficacy of natural (chromic catgut, CC) or synthetic (polyglycolic acid, PGA) absorbable suture material used for uterine incision, with or without intra-peritoneal infusion of sodium carboxy methyl cellulose (SCMC 1% 14 ml/kg) during caesarean for preventing the post-operative formation of uterine adhesions. All the animals were evaluated for the presence of uterine adhesions either between 30–40 days post-caesarean or at the time of post-mortem if the animal died during the course of study. The animals were divided into groups, viz. 1a (CC, n=9), 1b (CC+SCMC, n=10), 1c (PGA, n=10) and 1d (PGA+SCMC, n=12). All the animals of group 1a exhibited severe degree of uterine adhesions whereas percentage of animals exhibiting severe uterine adhesions were less in

group 1d compared to group 1a and 1b. Depending upon the time elapsed between the occurrence and relieving of the dystocia through caesarean section, animals were divided into groups, viz. 2a (12h, n36h, n=18). Majority of the animals in group 2a either had no development of uterine adhesions or were not of severe degree in comparison to group 2c. In conclusion, formation of uterine adhesions could be prevented by the use of PGA, instead of CC, for suturing uterine incision along with intra-peritoneal infusion of SCMC during caesarean. Moreover, caesarean section should be performed preferably within 12 h of occurrence of dystocia to reduce the severity of post-caesarean uterine adhesions.

0176. Ram Sajan; Narendra Dev University of Agriculture and Technology, Faizabad (India). Singh, S.P.; Narendra Dev University of Agriculture and Technology, Faizabad (India). Varma, Rachna; Narendra Dev University of Agriculture and Technology, Faizabad (India). Choudhary, G.K.; Narendra Dev University of Agriculture and Technology, Faizabad (India). Atul Prakash; Narendra Dev University of Agriculture and Technology, Faizabad (India). Histological changes and protective effect of pipali (*Piper longum*) in arsenic intoxicated cockerels. *Indian Journal of Animal Sciences* (India). (Jul 2010) v. 80(7) p. 647-649 KEYWORDS: COCKERELS. PIPER LONGUM. ARSENIC. HISTOPATHOLOGY.

The toxic effects of arsenic on the visceral organs of cockerel and protective effect of pipali (*Piper longum*) were evaluated in this study. Male White Leghorn chicks were divided randomly and equally into group 1(control), 2(arsenic 50 ppm), 3 (arsenic 100 ppm), 4 (arsenic 50 ppm + pipali 100ppm) and 5 (arsenic 100 ppm + pipali 100ppm). The experimental birds were kept in deep litter system of housing and maintained on grower ration. Birds were sacrificed after completion of 12 weeks feeding trial. At the time of necropsy organs such as liver, spleen, kidney, intestine and bursa were examined for the presence of pathological lesion. Histopathological examination reveals haemorrhages and infiltration of mononuclear cells in intestine, hydropic degeneration of hepatocytes and congestion, degeneration, necrosis, haemorrhages and infiltration of mononuclear cells in hepatic cord. Oedema, congestion, hemorrhage and infiltration of inflammatory cells in lung and degeneration of renal tubular epithelium were observed in dose dependent manner in the cockerels fed on arsenic containing feed for 12 weeks. Histopathological changes were not observed in control group as well as in pipali + arsenic fed cockerels. It is concluded from the present study that the pipali produced protective effect in arsenic induced histopulmonary and renal histopathological changes in poultry.

0177. Sutar, A.U.; Maharaja Jivajirao Shinde Mahavidyalaya, Ahmednagar (India). Kengar, S.B.; Y. C. College of Science, Satara (India). Patil, S.S.; Krishana Mahavidyalaya, Satara (India). Khan, M.R.; Dada Patil Mahavidyalaya, Ahmednagar (India). Prevalence of Gastrointestinal Parasites in Goats of Ahmednagar district of Maharashtra. *Veterinary World* (India). (Oct 2010) v. 3(10) p. 456-457 KEYWORDS: GOATS. DIGESTIVE SYSTEM DISEASES. HELMINTHS. MAHARASHTRA. MORBIDITY.

Helminth parasites of digestive system of goats in Ahmednagar District of Maharashtra were studied during the period January 2009 to December 2009. For these 400 faecal samples of goats from different villages were collected. Out of 400 samples 251 were positive (62.75%). In rainy season, out of 150 faecal samples examined 116 were positive (77.33%), while in winter out of 120 samples examined 73 were positive (60.83%) and in summer out of 130 samples examined 67 were positive (51.53%).

0178. Dinesh Kumar; PDDUVASU, Mathura (India). Department of Pathology. Srivastava, A.K.; PDDUVASU, Mathura (India). Department of Pathology. Sanjiv Kumar; PDDUVASU, Mathura (India). Department of Pathology. Quantitative Assay of Arsenic in Experimentally Intoxicated Guinea Pigs. *Veterinary World* (India). (Oct 2010) v. 3(10) p. 463-465 KEYWORDS: GUINEA PIGS. POISONING. ARSENIC.

The present investigation was undertaken with an attempt to generate information pertaining to the assessment of arsenic residues in the vital organs like liver, lungs kidneys along with blood and hair as biomarker of chronic arsenic exposure using guinea pigs as experimental animal. For this purpose the guinea pigs were divided into two groups having 5 animals in each group. Group I animals were fed 1% of Arsenic trioxide 1 mg/kg body weight through oral gavages daily for 90 days to produce chronic toxicity. Estimation of

arsenic residue was carried out on 90th day post administration. In the present study chronic exposure to arsenic resulted in significant enhancement of arsenic residues in the blood, hair, liver, lungs and kidneys with mean values of 57.18, 333.71, 331.96, 95.8 ppb and 272.95 in guinea pigs of chronic toxicity as compared to 3.47, 14.02, 12.94, 2.56 and 5.56 ppb in control, respectively.

0179. Selvaraju, M.; Madras Veterinary College, Chennai (India). Department of Animal Reproduction, Gynaecology and Obstetrics. Veerapandian, C.; Madras Veterinary College, Chennai (India). Department of Animal Reproduction, Gynaecology and Obstetrics. Effect of PGF2 alpha on Oestrus and Fertility rate in repeat breeder cows treated with Norgestomet-Oestradiol. *Veterinary World (India)*. (Oct 2010) v. 3(10) p. 466-468
KEYWORDS: COWS. REPRODUCTIVE DISORDERS. PROSTAGLANDINS. FERTILITY.

A total of 48 repeat breeder cows were equally divided in to two treatment groups as NOR and NOR-PG and were treated with norgestomet ear implants on day 10 following natural oestrus and a control group. At the time of ear implant insertion, 2 ml of SMB injection was administered intramuscularly to all the cows. The implant was removed after 9 days. Cows in NOR-PG group were injected with 0.98 mg of PGF2a at the time of implant removal. In NOR and NOR-PG groups, AI was done at 48 and 72 hours of implant withdrawal. In control group, cows were artificially inseminated twice at 24 hours interval during natural oestrus. Blood samples were collected at the time of implant insertion and withdrawal in all the treated cows for progesterone assay. There was 100 per cent oestrus response following implant removal in NOR and NOR-PG groups. The conception rate obtains in NOR, NOR-PG and control groups were 43.75, 37.50 and 18.75 per cent, respectively. The overall mean level of progesterone (6.31 ± 0.32 ng/ml) noticed at the time of implant insertion was significantly reduced to a lower level (1.38 ± 0.16 ng/ml) by the time of its removal in treated cows. It is inferred that norgestomet–oestradiol alone without PGF2a may be used to augment fertility in repeat breeder cows under field conditions.

Q03 Food Contamination and Toxicology

0180. Smita; College of Veterinary Science, Anand (India). Department of Veterinary Public Health. Bhong, C. D.; College of Veterinary Science, Anand (India). Department of Veterinary Public Health. Brahmabhatt, M.N.; College of Veterinary Science, Anand (India). Department of Veterinary Public Health. Selective culture media for the recovery of *Aeromonas* spp from poultry meat. *Indian Journal of Veterinary Research (India)*. (Jul Dec 2011) v. 20(2) p.66-68
KEYWORDS: AEROMONAS. POULTRY. MEAT. SELECTIVE MEDIA.

Different selective culture media were evaluated for isolation of *Aeromonas* spp. from 120 poultry meat samples. The recovery of *Aeromonas* isolates was highest from Ampicillin Dextrin Agar (89.39%), followed by *Aeromonas* Starch DNase agar (68.18 %) and *Aeromonas* isolation media (18.18 %).

0181. Vijayarani, K.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Parthiban, M.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Raja, A.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Kumanan, K.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Occurrence and characterization of *Escherichia coli* O157:H7 and other serotypes in goat and sheep meat in India. *Indian Journal of Animal Sciences (India)*. (Oct 2010) v. 80(10) p. 1019-1021
KEYWORDS: MUTTON. GOAT MEAT. MEAT. QUALITY. MEAT YIELD. SEROTYPES. ESCHERICHIA COLI.

In the present study 307 goat and sheep meat samples were tested for *Escherichia coli* serotypes, which resulted in 4 Enterohaemorrhagic *Escherichia coli* (EHEC) from goat meat. All the four isolates produced verotoxin as evident from the in-vitro vero cell assay and the multiplex PCR. Serotyping of these isolates indicated that one isolate belonged to serotype O157 (M2), 2 to serotype 071 (23 and C3) and 1 to 060 (M). Molecular typing also confirmed that, isolate M2 belonged to O157 serotype with positive amplification for eae A and hly A primers. PCR with H7 gene specific primers also gave positive amplification with isolate M2,

indicating that this isolate belonged to 0157:H7 serotype. Further studies for antibiotic resistance indicated that the E. coli 0157HH7 isolate from goat meat had multiple antibiotic resistances.

0182. Chakravarthi, V. P.; Veterinary College and Research Institute, Namakkal (India). Shanmugasundaram, K.; Veterinary College and Research Institute, Namakkal (India). Malmrangan, S.; Veterinary College and Research Institute, Namakkal (India). Invitro Assessment of Bacteriostatic Potency of Egg Yolk Immunoglobulin against Escherichia coli. Veterinary World (India). (Oct 2010) v. 3(10) p. 460-462
KEYWORDS: EGG YOLK. IMMUNOGLOBULINS. DISINFECTANTS. ESCHERICHIA COLI.

The present study was carried out in commercial layer chickens to assess the bacteriostatic potency of egg yolk immunoglobulin IgY against food poisoning pathogen. The O antigen of food poisoning pathogen Escherichia coli was prepared and used to immunize commercial layer chickens. The eggs which contain anti-E.Coli IgY was collected on 30 th day of first injection and stored at 4 0 C. The antibacterial IgY was separated by water dilution method (10 times diluted with distilled water, pH 5.0 - 5.5, incubated at 4 0 C for 6 hrs) and purified by 60 % ammonium sulphate. The recovery of IgY was in range of 57-62 %. The pathogens in Tryptic soya broth (approx. 6X10⁸/ ml) were cultured with anti-E.coli IgY 20 mg /ml and inhibitory effect was measured in UV spectrophotometer at 550 nm. The resultant growth curve indicated that the application of polyclonal antibodies (Ig Y) on meat could be used to prevent the E.coli food poisoning.

Q51 Feed Technology

0183. Kiran, D.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veterinary College, Department of Livestock Production and Management Krishnamoorthy, U.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veterinary College, Department of Livestock Production and Management Manju, G.L.; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veterinary College, Department of Livestock Production and Management Manjunath, V .; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Veterinary College, Department of Livestock Production and Management. Relationship between Gas Production, True Degraded Organic Matter and Microbial Biomass Synthesis for Protein Feedstuffs as Influenced by Incubation Time in the In vitro Gas Production. Animal Nutrition and Feed Technology (India). (Jan 2011) v. 11(1) p. 53-62
KEYWORDS: PROTEIN CONCENTRATES. FERMENTATION. BIOMASS.

Five protein feedstuffs, namely ambadi (*Hibiscus cannabinus*) cake, cottonseed meal, groundnut meal, rapeseed meal, and sesame meal were evaluated using the in vitro gas production technique, for fermentation stoichiometry, gas production, true digested organic matter (TDOM) and microbial biomass (MB) synthesis at incubation time of half asymptotic gas production ($T_{1/2}$) and 24 h. The mean molar ratio of short chain fatty acids (c2:c3:c4) for the protein supplements at $T_{1/2}$ and 24 h were 0.71:0.20:0.09 and 0.72:0.19:0.09, respectively. The mean gas production (ml/g DM) at $T_{1/2}$ and 24 h were 101.2 and 196.3 respectively, whereas the TDOM (mg/g DM) at the corresponding incubations were 578.6 and 657.5. Similarly, mean partitioning factor (PF) at $T_{1/2}$ (5.87) was significantly (P0.0001) higher than at 24 h (3.37). The MB (mg/g DM) in the apparent undigested residue in the incubations was 172.8 and 100.0 at $T_{1/2}$ and 24 h, whereas the RNA equivalents (mg/g DM) for the corresponding incubations were 9.69 and 7.45, respectively. However, the ratio of RNA: MB at $T_{1/2}$ and 24 h were 0.0581 and 0.0808, respectively

Q52 Feed Processing and Preservation

0184. Ambasankar, K.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India). Balakrishnan, V.; Tamil Nadu University of Veterinary and Animal Sciences, Chennai (India). Effect of varying levels of heat and formaldehyde treatment of sardine fishmeal on nitrogen solubility, in vitro ammonia release and protein fractions. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1003-1007
KEYWORDS: FISH MEAL. FORMALDEHYDE. IN VITRO EXPERIMENTATION.

The study was conducted to determine the effect of different levels of heat and formaldehyde treatment on nitrogen solubility, in vitro ammonia release and protein fractions of sardine fish meal. Heat treatment of sardine fish meal was carried out at 110, 120, 130, 140 and 150°C for 30, 60 and 120 min. significantly lowest nitrogen solubility was observed at 150°C for 120 min in all the 4 solvents tested. A significantly lowest ammonia concentration was observed in heat treated sardine fish meal at 150°C at 120 min. A significantly higher B2 + B3 – C (undegradable but digestible protein) was obtained at 130°C for 120 min and there was no significant increase beyond this temperature and time. Formaldehyde treatment was examined at 0.5, 1.0, 1.5 and 2.0 g formaldehyde per 100 g crude protein. The nitrogen solubility and in vitro ammonia concentration was reduced significantly at 1% formaldehyde treatment. Sardine fish meal protein fractions A, B1, B2 and B3 showed significant change at 1% formaldehyde treatment. On a holistic view it could be considered that heat treatment at 130°C for 120 min and formaldehyde treatment at 1% level were optimal for protection sardine fish meal protein.

Q53 Feed Contamination and Toxicology

0185. H Tikenbala Devi,; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Ghosh, C.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Datta, B.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Dasgupta, Raju; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Mukhopadhyay, S.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Mandal, T.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Sarkar, Samar; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Chakraborty, A.K.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Arsenic exposure on bovine health and environmental pollution with special emphasis on groundwater system in Manipur. Indian Journal of Animal Sciences (India). (Jul 2010) v. 80(7) p. 642-646 KEYWORDS: CATTLE. ARSENIC COMPOUNDS. ORGANOARSENICAL COMPOUNDS. ARSENIC. HEAVY METALS. POLLUTION. SOIL POLLUTION. WATER POLLUTION.

There was high arsenic content in soil, drinking water and grass in Manipur suggestive of environmental pollution by the arsenic contaminant, which was due to groundwater containing arsenic more than the permissible limit. The cattle of 2 zones in Manipur were selected for the present study, i.e. Kakching block in Thoubal district as exposed zone and Kamjong block in Ukhrul district as control zone. The arsenic content in faeces, urine, milk, hair and serum in cattle of exposed zone were higher compared to control zone. High concentration of arsenic in milk indicated the presence of arsenic in food-chain. It suggests the testing of milk and hair for arsenic concentration that could be considered as biomarker to assess the arsenic exposure.

Q54 Feed Composition

0186. Kaur, K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Wadhwa, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Bakshi, M.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). . Nutritional evaluation of Pleurotus florida harvested spent wheat–rice straw based diets in goats. Indian Journal of Animal Sciences (India). (Aug 2010) v. 80(8) p. 750-753 KEYWORDS: GOATS. RICE STRAW. WHEAT STRAW. PLEUROTUS FLORIDA. NUTRITIVE VALUE.

An experiment was conducted to evaluate the nutritional worth of spent wheat straw-rice straw (WS-RS) in 50 : 50 ratio in the complete feed of goat kids. The cultivation of Pleurotus florida (edible mushroom) on WS-RS (50: 50) resulted in low in OM, hemicellulose and NDF but enriched the straw with microbial protein. The digestion kinetic parameters for DM and NDF revealed that insoluble but potentially degradable fraction was low in spent WS-RS as compared to ordinary WS-RS. The apparent extent of digestion was lower in spent WS-RS as compared to WS-RS, resulting in higher rumen fill value predicting low voluntary DM intake in spent WS-RS. The loss in OM and other nutrients during fungal cultivation resulted in low net gas production and

low in-vitro OM and NDF digestibility in spent WS-RS. The in-sacco and in-vitro gas production studies revealed that the spent straw due to heavy OM loss during mushroom cultivation had lower nutritional worth as compared to WS-RS. The effect of incorporation of WSRS or spent WS-RS in isocaloric and isonitrogenous complete feed on the performance of goat kids was assessed. The WS-RS or spent WS-RS along with concentrate in 60: 40 ratio for 90 days revealed that spent WS-RS diet was palatable as indicated by higher DM intake. The digestibility of nutrients (except that of cellulose which was depressed), blood profile (except total protein and globulin which were depressed), N-retention, apparent biological value and daily live weight gain were comparable in both the groups. It was concluded that though spent WS-RS had lower nutritional worth than WS-RS but could be incorporated in isonitrogenous and isocaloric complete feed without any adverse effect on the performance of kids.

0187. Anil Kumar; Indian Grassland and Fodder Research Institute, Jhansi (India). Alzahal, O.; Indian Grassland and Fodder Research Institute, Jhansi (India). Singh, K.K.; Indian Grassland and Fodder Research Institute, Jhansi (India). McBride, B.W.; Indian Grassland and Fodder Research Institute, Jhansi (India). In vitro nutritional evaluation of chaya (*Cnidioscolus aconitifolius*) for use as livestock feed. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1008-1010 KEYWORDS: LIVESTOCK. FEEDS.

Chaya (*Cnidioscolus aconitifolius*, family-Euphorbeaceae), an underutilized perennial vegetable shrub was introduced in India in 2006 to test its feasibility for use as a fodder plant. The leaves and fodder chaya contained on dry matter basis, respectively, crude protein (27.40 and 17.96%), NDF (27.76 and 30.82%), ADF (21.47 and 24.33%), lignin (5.9 and 6.6%), ether extract (9.27 and 3.61%), ash (11.88 and 9.84%) and starch (0.41 and 5.31%). The macro minerals in leaves and fodder chaya were, respectively, estimated as, viz. calcium (1.78 and 1.92%), phosphorus (0.31 and 0.28%), potassium (2.34 and 1.44%), magnesium (0.60 and 0.54%) and sodium (0.20 and 0.29%). The micro mineral contents (ppm) in leaves and fodder chaya were respectively, Zinc (46.60 and 22.13), copper (5.61 and 3.74) and manganese (131.47 and 85.48). The nutrient content of chaya leaves as well as fodder chaya is superior to that of the leguminous fodder currently used to feed livestock. Initial estimates indicated a yield of fodder chaya in the range of 1000 to 2000 q/ha. It was concluded that chaya has a good nutritional profile and can be a potential source of quality feed for livestock.

0188. Wadhwa, M.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Kaur, K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Sukhchain; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Bakshi, M.P.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Nutritional evaluation of new oats variety as fodder. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1011-1013 KEYWORDS: OATS. NUTRITIVE VALUE. WATER BUFFALOES.

Nutritional worth of new variety of green oats developed by Punjab Agricultural University, Ludhiana, was assessed. The check (OL-9) and the new (OS-342) variety of oats were cultivated at different locations in the Punjab State for 3 consecutive years. The overall average green forage and DM yield of new variety was 14.0 and 21% higher than the check variety of oats. The chemical composition of both the varieties was comparable. The in vitro screening revealed that the net gas production and ME availability were higher in new than check variety of oats. Adult male buffaloes (8; 465.75±3.97 kg BW) divided into 2 equal groups were offered either check variety (OL-9) or new variety (OS-342) of green oats ad lib, supplemented with mineral mixture and common salt for 30 days. The daily DM intake and digestibility of nutrients were slightly higher in new variety than that of the check variety but the differences were nonsignificant. The NPN concentration in the rumen liquor of animals fed new oats variety was lower than those fed check variety, but reverse trend was observed with respect to TCA-N. The blood profile, urinary excretion of purine derivatives and the microbial protein synthesized in the rumen of animals offered check or new oats variety were statistically comparable. The faecal-N excretion was lower in animal fed new variety as compared to check variety resulting in higher CP digestibility in new oats variety. The total-N excretion was comparable in both the groups, resulting in

comparable Nretention and apparent biological value. It was concluded that new oats variety (OS-342) had an edge over the check variety (OL-9) with respect to yield and quality.

0189. Dubey, M.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Dutta, Narayan; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Sharma, K.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Pattanaik, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Banerjee, P.S.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Singh, M.; Indian Veterinary Research Institute, Izatnagar (India). Centre of Advanced Studies in Animal Nutrition. Effect of Condensed Tannins Supplementation from Tanniferous Tree leaves on In vitro Nitrogen and Substrate Degradation. Animal Nutrition and Feed Technology (India). (Jan 2011) v. 11(1) p. 115-122 KEYWORDS: TANNINS. NITROGEN METABOLISM.

This study was carried out to assess the effect of strategic use of condensed tannins (CT) from tanniferous tree leaves on the in vitro nitrogen and substrate degradation. Tanniferous tree leaves of *Psidium guajava*, *Ficus bengalensis*, and *Ficus infectoria* were selected as a potential CT sources and used at graded levels (0, 1.0, 2.0 and 3.0%) to protect the nitrogen degradation of mustard oil cake (MOC). Supplementation of CT 1-3 percent significantly ($P < 0.01$) reduced the in vitro nitrogen degradation (0.87-0.51) irrespective of CT sources, however, nitrogen protection in the rumen was highest ($P < 0.01$) at 3.0 percent CT inclusion followed by 2 and 1 percent CT levels. CT inclusion from all the three tropical tree leaves exerted similar effect on in vitro nitrogen degradability of MOC and reduced 39% in vitro nitrogen degradation of MOC. Gas volume produced in 24 h (ml/200 mg) and partitioning factor were reduced significantly ($P < 0.01$) with CT supplementation from 1 to 3% levels, though, efficiency of microbial-biomass production increased significantly ($P < 0.01$). Truly degradable organic matter in rumen did not differ significantly ($P < 0.05$) up to 2% CT inclusion. It may be concluded that condensed tannins from tanniferous tree leaves can be used effectively to protect the nitrogen degradation of mustard cake without any adverse effect on substrate degradation.

U10 Mathematical and Statistical Methods

0190. Pankaj, P.K.; National Dairy Research Institute, Karnal (India). Nagpaul, P.K.; National Dairy Research Institute, Karnal (India). Roy, B.; National Dairy Research Institute, Karnal (India). Mishra, A.; National Dairy Research Institute, Karnal (India). Prediction of age and body weight by linear muzzle measurements in Karan Fries crossbred cattle. Indian Journal of Animal Sciences (India). (Oct 2010) v. 80(10) p. 1028-1030 KEYWORDS: CATTLE. CROSSBREDS. STATISTICAL METHODS. AGE. BODY WEIGHT.

Karan Fries cows (276) of different categories maintained at Cattle Yard, National Dairy Research Institute, Karnal, Haryana, were used to predict the age, body weight of Friesian crosses by muzzle measurement technique. Muzzle measurements, viz. basal length (X_2), upper length (X_2), central length (X_2), muzzle span (X_4), muzzle length (X_5) and muzzle area (X_6), were taken. The correlations of age and body weight with all muzzle measurements were significantly positive and muzzle measurements are better predictor of body weight than that of age. Multiple regression equation for prediction of age (Y_1) was found to be: $Y_1 = 1194.81 + (-0.10) X_2 + 38.69 X_2 + (-5.76) X_2 + (-91.55) X_4 + (-50.19) X_5 + 1.42 X_6$ $R^2 = 80.88\%$ Multiple regression equation for prediction of body weight (Y_2) was found to be: $Y_2 = (-69.06) + (-0.04) X_2 + 4.27 X_2 + 0.66 X_2 + (-6.91) X_4 + (-2.32) X_5 + 0.12 X_6$ $R^2 = 91.79\%$.

0191. Suresh, K.P.; National Institute of Animal Nutrition and Physiology, Bangalore (India). Bhatta, Raghavendra; National Institute of Animal Nutrition and Physiology, Bangalore (India). Mondal, S.; National Institute of Animal Nutrition and Physiology, Bangalore (India). Sampath, K.T.; National Institute of Animal Nutrition and Physiology, Bangalore (India). Effect of Bypass Protein on Milk Yield in Indian Cattle – A Meta-

analysis. *Animal Nutrition and Feed Technology (India)*. (Jan 2011) v. 11(1) p. 19-26 KEYWORDS: CATTLE. PROTEIN CONTENT. MILK YIELD. STATISTICAL METHODS.

Twenty Indian studies pertaining to feeding of undegradable dietary protein (UDP) on milk production in lactating cows were selected. Based on inclusion and exclusion criteria to safeguard against the selection bias, only fourteen studies could be considered for conducting a meta-analysis. All the data included in the present study were from experiments conducted under iso-caloric diets and early to mid lactation with medium milk production (around 10 kg). The bypass protein intake was converted to UDP intake g/animal/day as input variable and milk yield was converted to 4% FCM (fat corrected milk) in order to achieve uniformity in study results. The UDP intake (g/animal/day) was categorized into 0–100, 101–200, 201–300, 301–400, 401–500 and 501–600. A database on UDP intake (g/animal/day), milk yield (kg) and fat % were developed based on the studies selected. The data were analysed using the Metacalculator. The results indicated increase in milk yield as the UDP intake was increased. The amount of 4% FCM was 6.62 kg (SD: 0.43) at 0–100 g UDP intake and progressively increased to 10 kg when the UDP intake was 600 g/animal/day. The milk production response was observed to be quadratic i.e. milk production increased with increasing UDP intake and thereafter milk production showed decreasing trend for unit increase in UDP levels. From the meta-analysis of the data, it could be concluded that feeding of UDP is beneficial in increasing milk yield and the optimum level of UDP required for production of 10 kg 4% FCM among Indian cattle is about 571 g/animal/day.

How to obtain the full text of documents

1. Recommendations to scientists

- First determine whether your local library or another library in your area can provide you with a copy of the document you want.
- Most authors keep small stocks of reprints of their own publications, and they are usually prepared to respond to a polite request from a fellow scientist.
- In addition many of the NARD Input Centers have a document delivery service. Your librarian may write and request a photocopy for which you may often be charged the photocopy and mailing cost.
- If your librarian is unable to find the document you want, you could send us the document delivery coupon which is included in each copy of this journal. This coupon enables you to ask the NARD Headquarter to supply one or two items for your personal interest. We make no charge for this limited service, but the coupons should be used only as a last resort.
- Because of copy right regulations, photocopies of entire publications (e.g. complete books) cannot be provided.

2. Recommendations to librarians

- Become a NARD member early and get your work visible to others.
- Establish good working relationships with other librarians and be as helpful as possible in providing document delivery services from the collection you hold.
- Make your managers aware of the importance of having your own collection effectively organized, with back copies available for document delivery with access to a photocopy machine and some funds to provide requested copies of your documents.
- Contact the NARD Headquarter to make sure that relevant publications of your institution are entered/indexed in NARD.

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

✕ -----

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

✕ -----

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

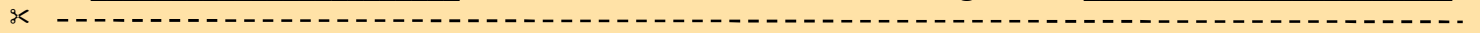
Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

My name and institutional address are:

Date: _____

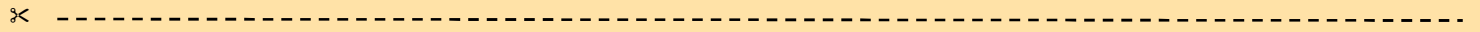
Signature: _____



My name and institutional address are:

Date: _____

Signature: _____



My name and institutional address are:

Date: _____

Signature: _____