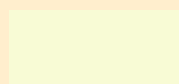


# **The Indian Animal Sciences ABSTRACTS**



**भारतीय  
ICAR**

**Indian Council of Agricultural Research  
New Delhi**



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## SAMPLE ENTRY

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

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

## **E70 Trade, marketing and distribution**

204. Yogi, R.K.; ICAR, Karnal (India). National Dairy Research Institute. Verma, N.K.; ICAR, Karnal (India). National Dairy Research Institute. Jain, D.K.; ICAR, Karnal (India). National Dairy Research Institute. Singh, Rishikanta; ICAR, Karnal (India). National Dairy Research Institute.. Effect of bio-economic traits on market value of live goats : A case study of indigenous goat breeds.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.805-809 KEYWORDS: BODYWEIGHT. BIOENERGY. MARKETING. GOATS. MILK YIELD.

Small ruminants in developing countries are mainly kept by local pastoralists under low-input production systems. The livelihood of the flock holders can be enhanced by the technical and institutional interventions. In this study, effect of bio-economic traits including age (Ag), live body weight (Bw), milk production (Mp), order of lactation (Or), prolificacy (Pj), favorable mark (Fm) and breed (Br) on market value of live goat was investigated. Study revealed that magnitude of difference in various traits of breeds ranged from 200 to 800%. It was observed that extent of variation in bio-economic traits of descript breeds was comparatively lower in case of both categories of dairy and meat goat. Non-descript breeds of the goat animals including dairy and meat goat fetched higher price over the descript breeds. Multiple regression analysis was applied to identify the potential economic traits of the breed. Mp and Bw had a direct and significant influence on the market value of the dairy goat. Similarly, Bw influenced the market value of meat goat positively while Ag was found to have adverse influence. Economic traits namely Mp, Fm and Bw of the live goat animals were observed as significant characteristics affecting the market value directly. These characteristics may be important for obtaining price premium. Institutional and technical interventions to enhance the milk productivity and gain in body weight of the live goat animals may be a strategic approach to benefit this sector.

## **J13 Handling, transport, storage and protection of animal products**

205. Khan Mehdi, K.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding. Kumar, N.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding. Chakraborty, D.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding. Kumar, D.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding. Das, A.K.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding. Taggar, R.K.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Jammu & Kashmir (India). Division of Animal Genetic and Breeding.. Wool type of regional Sheep (Purky) of Kargil.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.92-94 KEYWORDS: WOOL. SHEEP. SHEARING.

A total of 161 wool samples of adult sheep of both sexes were collected randomly and analyzed for different wool production traits at Fleece testing laboratory, Kartholi, Jammu. The average annual wool production was 1.33 kg. Among four different wool colour, white colour showed the highest

percentage. Coefficient of variations for all the traits was very low except for medullation. Phenotypic correlations among wool traits were very low and most of them were negative barring few exceptions. The values of analysis of wool parameters suggested that wool of Purky sheep is of coarse type.

## **L01 Animal husbandry**

206. Maher, Dinesh; ICAR, Karnal (India). National dairy Research Institute. Gupta, A.K.; ICAR, Karnal (India). National dairy Research Institute. Bhakat, Mukesh; ICAR, Karnal (India). National dairy Research Institute. Upadhyay, Arpan; ICAR, Karnal (India). National dairy Research Institute. Mir Moshin, Ayoub; ICAR, Karnal (India). National dairy Research Institute.. Analysis of lactation specific demographic parameters of Tharparkar cattle.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.767-769 KEYWORDS: LACTATION. DEMOGRAPHY. SURVIVAL. CATTLE.

The most important factor in milking herd is to maintain lactating cows in subsequent lactations, which depends upon satiability of lactating animals. Therefore a study on records of 168 Tharparkar females maintained during 1980-2010 at Livestock Research Centre, National Dairy Research Institute, Kamal (Haryana) were conducted to estimate the lactation specific demographic parameters. The results depicted that the survival and loss rates in first lactation were 70% and 30%, respectively. In fifth lactation survival rate was highest (76%) and disposal rates were the lowest (24%). There was no definite trend of survival and disposal rate across different lactations. Satiability results showed that the probability of an animal to survive in the herd decreased with the increasing number of lactations. The satiability for the first lactation was one whereas, the values revealed a consistent decline in subsequent lactations. Age distribution of cows present in the herd (p.) for first lactation was 0.314 and 0.217, 0.154, 0.107, 0.069, 0.053, 0.034, 0.025, 0.015, 0.009, 0.003, 0.001 in subsequent lactations. Around one third of the total herd comprised of the first calvers (31 %) and one fifth belongs to the females of second lactations (21.7%). Overall the herd of lactating cows comprised of 79.2% of animals in lactations up to fourth parity. Age distribution of cows left the herd (qx) in first and subsequent lactations was 0.300 and 0.201, 0.167, 0.099, 0.053, 0.054, 0.029, 0.029, 0.016, 0.019, 0.005 and 0.005, respectively. From the results it could be concluded that the cows in first lactation was expected to remain in the herd for 2.24 lactations more. Expected herd life decreased with the increase in lactation order.

207. Haque, M.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Hazarika, P.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Saharia, K.K.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Ray, M.N.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Borgohain, A.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Das, Mukut; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Department of Extension Education. Constraints perceived by the self help groups (SHGs) engaged in livestock enterprises in availing bank loans. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.43-45 KEYWORDS: CONSTRAINTS. LIVESTOCK. LOANS.

SHG members seek bank loans under urgency to meet some acute income generating needs for better livelihood. Hundred representative SHG members from Darrang and Kamrup districts of Assam through Rank Based Quotient (RBQ) technique revealed that constraints relating to; more visits to bank than actually required delay in opening of bank account delay in sanction of bank loan and ;under finance; needed effective attention from banks.

208. Dangar, N.S.; Navsari Agricultural University, Navsari (India). College of Veterinary Science and Animal Husbandry. Department of Instructional Livestock Farm Complex. Vataliya, P.H.; Navsari Agricultural University, Navsari (India). College of Veterinary Science and Animal Husbandry. Department of Instructional Livestock Farm Complex.. Factors affecting lactation milk yield in Gir Cattle. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.71-73 KEYWORDS: LACTATION. MILK YIELD. CATTLE.

The production records on 346 Gir cows with 680 complete lactations sired by 62 bulls, for 24 years (1987-2010) were studied. The data were analyzed to study the effect of period and season of calving and parity as fixed effect on lactation milk yield (LMY). The least-squares mean of LMY was  $2276.60 \pm 171.32$  kg. Highly significant effect of period of calving and parity on LMY was observed. There were highest LMY during fifth parity ( $2694.20 \pm 184.94$  kg.) and significant drop after eighth parity. Season of calving did not affect significantly LMY, which is one of the best attributes of Gir cattle.

209. Upadhyaya, Manju; Maharana Pratap University of Agriculture and Technology, Bhilwara (India). Krishi Vigyan Kendra. Yadav, C.M.; Maharana Pratap University of Agriculture and Technology, Bhilwara (India). Krishi Vigyan Kendra.. Involvement of members and non members of women dairy co-operatives in dairy husbandry activities.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.4-7 KEYWORDS: ROLE OF WOMEN. DAIRY FARMS.

The Bhilwara Zila Dugdh Utpadak Sahakari Sangh Limited; implemented the Rajasthan Women Dairy Project in the district in 1992. Two panchayat samities namely Asind and Shahpura were selected for the study as about 50 per cent (53 WDCS) were operating in the above two panchayat samities. From each of the selected panchayat samities 12 WDCSs were randomly selected for the study constituting 24 WDCSs in all. The study included two categories of respondents i.e. women milk producers who were members of the cooperative society (member) and women milk producers who has not obtained the membership of women dairy cooperative society (non member). This non-member group of respondents served as the control group of the study. Majority of the respondents from both the groups were of middle age group ranging from 34-45 years, having superior educational status of members as compared to non members. The analysis of caste that majority of the respondents belonged to the backward caste category (O.S.C.), where as in case of non- member upper caste were in majority. Majority of members (47.50%) possess 1-2 ha. where as non-members possessed land below 1 ha. Categorized as marginal farmer. Majority (52.5%) of non members had low income i.e. below Rs. 20,00;01- majority of members (37.5%) possessed above 6 milch animals where as majority of the non members (65.83%) possessed 1-2 milch animals. WDCS members had significant involvement in organizing all the four activities as compared to non-members.

210. Rawat, N.S.; College of Veterinary Science and Animal Husbandry, REWA(India). Dept. of Livestock Production and Management.Mishra, A.K.;College of Veterinary Science and Animal Husbandry, REWA (India).Dept. of Livestock Production and Management.Nanawati, S.; College of Veterinary Science and Animal Husbandry, REWA (India). Dept. of Livestock Production and Management.Baghel, K.K.S.; College of Veterinary Science and Animal Husbandry, REWA (India). Dept. of Livestock Production and Management.. Studies on suckling behavior of Gir Calves. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v.31(1-2) p.59-62 KEYWORDS: CALVES. SUCKLING. BEHAVIOUR.

A study was conducted on suckling behavior of 13 Gir calves of 0 to 15 days maintained at Kasturba Gandhi National Memorial Trust, Dairy Farm Kasturbagram Khandwa Road, Indore M.P. The male calves required lesser attempt to teat seeking ( $6.11 \pm 0.86$ ) as compared to female calves ( $11.77 \pm 0.82$ ). The male calves took longer duration ( $216.75 \pm 2.18$  minutes) to hold the udder for first time than that of female calves ( $121.00 \pm 2.08$ ) and lesser stroke for letting down of milk ( $1.86 \pm 0.35$ ) than female ones ( $2.81 \pm 0.33$  times). The summer born calves searched the udder in lesser attempts ( $7.33 \pm 0.33$ ) than those born in winter ( $10.54 \pm 0.78$ ). The effect of suckling traits on growth rate up to 45 days of their life showed that it had significant effect on growth rate at 30th days of age and there is no significant effect had exert at 15th and 45th days of age of Gir calves.

211. Sahoo, Kumar Saroj; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division.Singh, Avtar; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division.. Influence of genetic and non-genetic factors on fortnightly test-day milk yields and first lactation 305-day milk yield in Murrah Buffaloes.. Indian Veterinary Journal (India). (Sep 2015) v.92(09)p.16-19 KEYWORDS: WATER BUFFALOES. MILK YIELD. LACTATION. GENETICCONTROL.

The present investigation was carried out using data on 18871 fortnightly test-day (TD) milk yield records during first lactation of 961 Murrah buffaloes. Least squares maximum likelihood programme was used to estimate genetic and non-genetic parameters. The least squares means for first lactation 305-day milk yield (FL305DY) was found to be  $1853.49 \pm 15.88$  Kg. Effect of period, season and AFC groups was found to be highly significant (PO.OI), significant (P0.05) and non-significant on FL305DY, respectively. The  $h^2$  estimate of FL305DY was  $0.25 \pm 0.09$ . The estimates of genetic and phenotypic correlations between FL305DY and fortnightly TD milk yields ranged from 0.19 to 0.99 and from 0.52 to 0.83, respectively.

212. Dhawan, S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding.Yadav, A.S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding.Dhaka, S.S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding.Chakraborty, Dibyendu; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding. Genetic studies on production and production efficiency traits in Sahiwal Cattle. Indian Veterinary Journal (India). (Sep 2015) v.92(09)p.35-38 KEYWORDS: PRODUCTION. EFFICIENCY. CATTLE. GENETICS.

Data on first lactation production records of 815 Sahiwal cows from Government Livestock Farm (GLF), Hisar distributed over 36 years (1975 to 2010) were analyzed. The period of calving was significant (PO.OI) on all the traits



except for DAPY. The season of calving had significant effect on all the traits under study except FLY, DAPY and MSC. The winter calvers were excellent in production efficiency traits. The estimates of heritability were low to high. Correlations among production efficiency traits were high and positive. Selection on the basis of FPY would be effective for improvement of production efficiency traits.

213. Parhad, Meenal; College of Agriculture, Nagpur (India). Section of Animal Husbandry and Dairy Science. Atkare, V.G.; College of Agriculture, Nagpur (India). Section of Animal Husbandry and Dairy Science. Zinjarde, R.M.; College of Agriculture, Nagpur (India). Section of Animal Husbandry and Dairy Science.. Cost of Buffalo milk production according to productive range.. Indian Veterinary Journal(India). (Sep 2015) v92(09) p.75-77 KEYWORDS: WATER BUFFALOES. MILK YIELD. COST ANALYSIS.

The cost of milk production from dairying is an important aspect for producers, consumers and policy makers to provide effective linkage between the milk producer and consumers, so that the producer get remunerative price for their milk and consumers get milk and milk products at reasonable rate. The proportion of animals in milk was generally higher in commercial farms than in small and medium sized farms. The productivity of milk animals is of vital importance to livestock owners because it has direct influence on cost and returns. Feed constitutes as the major cost influencing factor.

214. Das, Mukut; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Mili, D.C.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Roychoudhury, R.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Gogoi, A.K.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Borah, M.C.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Borgohian, A.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Saikia, B.N.; AAU, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Cost and return traits of milk production in indigenous and crossbred Cows of Assam. Indian Veterinary Journal (India). (Sep 2015) v.92(09) p.88-90 KEYWORDS: COST ANALYSIS. MILK YIELD. CROSSBREDS. COWS.

The present study was conducted to study different cost and return traits of milk production in indigenous and crossbred cows of Assam. The ROFC, the feed cost efficiency, ROVC, FC:VC, break-even output, per cent of break-even output to total output, input-output ratio were recorded as Rs. 18,979.35, 53.74%, Rs.12,880.68, 1:7.01, 929.36 litres, 62.04, 1: 1.15 in crossbred cows and Rs.6,270.80, 129.82%, Rs.2,883.30, 1:4.91, 262.34 litres, 93.44, 1:1.12 in indigenous cows.

215. Pramila; Veterinary College, Bengaluru (India). Satyanarayan, K.; Veterinary college, Bengaluru (India). Jagadeeswary, V.; Veterinary college, Bengaluru (India). Krishnamoorthy, U.; Veterinary college, Bengaluru (India). Nagaraj, C.S.; Veterinary college, Bengaluru (India). Siddaramanna; Veterinary College, Bengaluru (India). Intensive cultivation of *Sesbania grandiflora* for sustainable dairy farming-an action oriented approach. Indian Journal of Animal Sciences

(India). (Sep 2015) v.85(9) p.996-999 KEYWORDS: CULTIVATION. MILK YIELD. RAPID RURAL APPRAISAL. SESBANIA GRANDIFLORA.

Development and growth of huge livestock population in India are dependent on availability of feed and fodder. But there exists a large gap between requirement and actual availability of feed and fodder at national level including green fodder. The green fodder shortage can be partially met out by intensively cultivating green fodder trees. An action oriented participatory approach was initiated in Chikkaballapur district of Karnataka to promote intensive cultivation of *Sesbania grandiflora*, a perennial fodder tree. The dairy farmers were sensitized and mobilized to take up intensive cultivation of *Sesbania grandiflora*. On-farm demonstrations were conducted to demonstrate effect of supplementation of *Sesbania* forage on milk yield in crossbred lactating cows. Constraints in adopting intensive cultivation of *Sesbania grandiflora* were identified through personal interview using structured interview schedule. The participant farmers cultivated *sesbania* intensively and the fodder was supplemented 5 kg/day/ cow. The milk yield increased significantly by 11.97% in cows supplemented with *Sesbania* forage. Lack of assured irrigation and electricity was ranked as the major constraint. Thus, small holder dairy farmers can successfully cultivate *Sesbania grandiflora* (100-200 trees) intensively in 1 or 2 guntas of fallow land with minimal or no inputs and green fodder scarcity can be minimized to some extent. The unit cost of milk production can be reduced by supplementing the *Sesbania* fodder to cross bred milking cows and thereby sustain dairy farming.

216. Prajapati, P.M. Sheikh, A.S. Desai, H.K. Participation of dairy farm women in animal husbandry practices in Mehsana district of north Gujarat. Gujarat Agricultural Universities Research Journal (India). (Jul 2015) v.40(2) p.96-99 KEYWORDS: DAIRY FARMS. ANIMAL HUSBANDRY. FARMS. ROLE OF WOMEN. GUJARAT.

In India, women's involvement in livestock management is a age old tradition and livestock rearing is an integral part of homestead farming system. Animal husbandry activities are performed by dairy farm women besides fulfilling their responsibilities as home makers. Moreover, the knowledge and skill of the dairy farm women and their participation in decision-making certainly affects effectively in their work, effectively. The study was conducted in Vijapur and Mehsana talukas of Mehsana district, where production of milk was highest as compared to other talukas. Ten villages having the larger number of females in milk producer' co-operative societies were selected purposively. The dairy farm women were selected by single stage random sampling method. The sample consisted of 120 respondents for the study. A large majority (89.16 per cent) of the dairy farm women had medium to high extent of participation in animal husbandry practices. The results of correlation analysis indicated that out of 17 independent variables, 14 independent variables viz., education, social participation, land holding, time spent in dairy activities, herd size, expenditure on dairy animals, occupation, annual income, mass media exposure, extension contact, scientific orientation, risk orientation, knowledge level regarding recommended animal husbandry practices, participation in decision making, were found positively and significantly correlated with extent of participation of dairy farm women in animal husbandry practices.

## **L02 Animal feeding**

217. Pal, D.T.; National Institute of Animal Nutrition and Physiology, Bangalore (India).Singh, Pramod; National Institute of Animal Nutrition and Physiology, Bangalore (India).Prasad, C.S.; National Institute of Animal Nutrition and Physiology, Bangalore (India). Verma. Swati; National Institute of Animal Nutrition and Physiology, Bangalore (India).Gowda, N.K.S.; National Institute of Animal Nutrition and Physiology, Bangalore (India).. Mineral release kinetics of common tropical green forages in the rumen of cattle.Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7)p.774-780 KEYWORDS: MINERAL CONTENT. RELEASE AGENTS. FORAGING. RUMEN. CATTLE.

The potential release of macro and micro minerals from six tropical green forages were determined by in sacco rumen degradability method. The release of minerals in the rumen were estimated in green forages (maize fodder, hybrid napier, doobgrass, para grass, berseem and sunhemp) by incubating the forage samples for different periods, i.e. 10h, 24h, 48h and 72h in three adult cattle fitted with rumen cannula by in sacco nylon bag technique. The release of macro and micro minerals from experimental green forages were significantly (P<0.001) different and highest release was observed in potassium (K) and lowest in calcium (Ca) from different classes of forages. The pattern of macro minerals release from different categories of green forages was as follows: K Mg P Ca. Among the green forages, berseem and sunhemp showed highest release of various minerals in the rumen at different periods of incubation. Manganese (Mn) release was lowest among the micro minerals from experimental green forages in the rumen. The pattern of micro minerals release from green forages was as follows: Cu Zn Mn. Results obtained from the study concluded that the potential availability of various minerals in the rumen from different classes of green forages was different and this information may be useful in strategic supplementation of minerals to animals through green forages.

218. Ankita; IVRI, Izzatnagar (India). AN Division.Saha, S.K.; IVRI, Izzatnagar (India). AN Division. Malapure, C.D.; IVRI, Izzatnagar(India). AN Division.Sahoo, S.; IVRI, Izzatnagar (India). AN Division.. Effect of feeding Sugarcane Press Mud (SPM) on dry matter intake, FCR and average daily gain in Goat kids.. Indian Veterinary Journal (India). (Jul 2015) v.92 (7) p.90-91 KEYWORDS: SUGARCANE. GROWTH. FEED INTAKE.

An experiment was conducted on eighteen goat kids to study the effect of SPM inclusion at 10% and 20% level in concentrate mixture on feed intake, FeR and average daily gain in goat kids. The experimental animals were randomly divided into 3 groups as T1(control), T2 (10% SPM) and T3 (20% SPM). After 120 days of metabolic trial, results revealed that the growth was significantly (P<0.05) lower in T3. The feed intake was comparable in all the groups, FeR was significantly (P<0.05) lower in T3 than 'T1'. whereas T2 was comparable to T1group.

## **L10 Animal genetics and breeding**

219. Parthiban, M.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Kumar Senthil, S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Balakrishnan, G; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Aarthi, K.S.; Tamil Nadu Veterinary and Animal

Sciences University, Chennai(India). Comparison of recombinant and whole cell leptospiral antigen against different cattle serovars of leptospira.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.705-708 KEYWORDS: RECOMBINANT ANTIGENS. LEPTOSPIRA. ANTIGENS.

220. Jeeva, K.; ICAR, West Kameng (India). National Research Centre on Yak.Chatterjee, N.; ICAR, West Kameng (India). National Research Centre on Yak.Bera, A.K.; ICAR, West Kameng (India). National Research Centre on Yak.Maiti, S.; ICAR, West Kameng (India). National Research Centre on Yak.Ram, Hira; ICAR, West Kameng (India). National Research Centre on Yak.Banerjee, P.S.; ICAR, West Kameng (India).National Research Centre on Yak.Goswami, T.K.; ICAR, West Kameng(India). National Research Centre on Yak.Das, P.J.; ICAR, West Kameng(India). National Research Centre on Yak.Chamua, J.; ICAR, West Kameng (India). National Research Centre on Yak.Milton, A.A.P.; ICAR,West Kameng (India). National Research Centre on Yak.Aravind, M.;ICAR, West Kameng (India). National Research Centre on Yak. Bhuvanapriya, G.; ICAR, West Kameng (India). National Research Centre on Yak.Thilagavathi, K.; ICAR, West Kameng (India). National Research Centre on Yak.Ghosh, S.K.; ICAR, West Kameng (India). National Research Centre on Yak.Deb, S.M.; ICAR, West Kameng (India). National Research Centre on Yak.Bhattacharya, D.; ICAR, West Kameng (India). National Research Centre on Yak.. An initial molecular signature of Indian isolates of Toxocara.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.709-713 KEYWORDS: MOLECULAR GENETICS. TOXOCARA.

This communication deals with molecular signature of *Toxocaracanis*, *T. cati* and *T. vitulorum* collected from different geographical locations and host assemblages of India. *T. vitulorum* was collected from cattle, yak and mithun of West Bengal, Arunachal Pradesh and Nagaland, respectively. Isolated parasites were initially identified morphologically before proceeding for molecular characterization. ATP synthase subunit 6 (*atp6*) gene had a 598 bp stretch which contained both the punctuation codons but was unique in its characteristics due to presence of abbreviated stop codon (T). On the basis of phylogenetic analysis of *atp6*, 12S and transcribed spacer sequences, three species could be clustered in three different groups. Number of preferred and non preferred codons also varied in between three species of *Toxocara* of Indian origin. *Atp6* gene had abundance in guanine (G) and thymine (T) bases which has also been described as unique characteristic for Neodermata. Restriction profile of transcribed sequences, 5.8S gene and a small fragment of 28S gene could differentiate Indian isolates of *Toxocara* in two different clades.

221. Mir, M.A.; ICAR, Haryana (India). National Dairy Research Institute. Chakravarty, A.K.; ICAR, Haryana (India). National Dairy Research Institute.Naha, B.C.; ICAR, Haryana (India). National Dairy Research Institute.Jamuna, V.; ICAR, Haryana (India). National Dairy Research Institute.Patil, C.S.; ICAR, Haryana (India). National Dairy Research Institute.Singh, A.P.; ICAR, Haryana (India). National Dairy Research Institute. Optimizing age at first freezing in relation to fertility of Murrah breeding bulls. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.719-722 KEYWORDS: AGE. FREEZING. FERTILITY. BULLS.

The optimization of age at first freezing in Murrah breeding bulls has been studied which will help in early selection of bulls for improving the reproductive performance in the herd. The data pertaining to age at first freezing (AAFF), conception rate based on first AI (CRFAI), overall conception rate (OCR)

and birth weight(B.WT) of 57 Murrah bulls during 1993 to 2014 belonging to 14 sets of Network Project on Buffalo Improvement at ICAR- National Dairy Research Institute, Kamal, Haryana were adjusted against environmental influence and subsequently analyzed. Simple and multiple regression models were developed for prediction of CRFAI and OCR of Murrah breeding bulls. By judging of three developed models (I to III) it was observed that Model III having age at first freezing and birth weight fulfill the accuracy of model, i.e. high coefficient of determination, low mean sum of square, due to error (MSSE), low conceptual predictive value (Cp value) and low Bayesian information criterion (BIC). The results revealed that optimum age at first freezing of Murrah bulls should be 2.5-3.0 years for 4.98% better conception rate based on first AI and 3.92% better overall conception rate in comparison to Murrah bulls with more than 3.5 years of age.

222. Chandran, P.C.; ICAR, Patna (India). Research Complex for Eastern Region. Pandian Jegaveera, S.; ICAR, Patna (India). Research Complex for Eastern Region. Dey, A.; ICAR, Patna (India). Research Complex for Eastern Region. Kamal, Reena; ICAR, Patna (India). Research Complex for Eastern Region. Kumari, Rajni; ICAR, Patna (India). Research Complex for Eastern Region.. Production and reproduction performances of Diara buffaloes in the Gangetic basin of Bihar.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.770-773  
KEYWORDS: WATER BUFFALOES. PRODUCTION. REPRODUCTION. BIHAR.

Morphometric and body weight traits studied in the present investigation indicate that Diara buffaloes are medium-sized animals with prominent forehead and loosely curved horns. They are smaller than the heavy-sized breeds like Murrah, Jaffarabadi and Nili-Ravi. The height, length and girth of female Diara buffaloes were  $94.96 \pm 0.58$  cm,  $92.96 \pm 0.49$  cm and  $115.93 \pm 0.81$  cm up to 1 year of age and  $133.60 \pm 0.69$  cm,  $138.36 \pm 0.74$  cm and  $200.79 \pm 0.95$  cm above 7 years of age, respectively. Estimated adult body weights of Diara buffaloes pooled over ages were found to be  $494.99 \pm 27.15$  kg in males and  $483.21 \pm 3.58$  kg in females. Diara buffaloes are good milkers with an average per day milk production was found to be 7.8 litre and peak yield reached up to 10.5 litre per day. Diara population remains so far largely untouched and breed improvement programmes, probably involving selective breeding, could be undertaken to further enhance the genetic potential of these buffaloes.

223. Gowda Chandre, C.T.; Veterinary College, Hebbal (India). Faizone, Nadeem; Veterinary College, Hebbal (India). Girish, P.S.; Veterinary College, Hebbal (India). Karabasanavar, Nagappa; Veterinary College, Hebbal (India). Bagale Shailesh, S.; Veterinary College, Hebbal (India).. Meat species identification using DNA based molecular techniques.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.800-804  
KEYWORDS: CYTOCHROME B. PCR. RFLP. SPECIES. DNA.

Techniques based on nucleotide sequencing and restriction fragment length polymorphism (RFLP) targeting mitochondrial (mt) cytochrome B (cyt B) gene were developed for identification of species of meat in the present study. Universal primers flanking mt cyt B gene were designed to yield a single amplicon of 450 bp size upon polymerase chain reaction (PCR) in all meat animal species. Sequencing of mt cyt B gene of cattle (*Bos indicus* / *Bos taurus*), buffalo (*Bubalus bubalis*), sheep (*Ovis aries*), goat (*Capra hircus*), chicken (*Gallus gallus*) and pig (*Sus scrofa*) was carried out and resultant sequences were aligned using

Basic Local Alignment Search Tool (BLAST) of National Centre for Biotechnological Information (NCBI) to establish the homogeneity and divergence in nucleotides among these species to ascertain unambiguous identification of origin of a meat species. Closely related species like cattle & buffalo; and sheep & goat could be differentiated conclusively by sequence analysis. Although nucleotide sequencing is a highly accurate technique, it is time consuming and costly. Hence, an economical, rapid and reliable RFLP method was developed. Nucleotide sequences of amplified fragments were mapped for restriction enzyme and MspI enzyme was found to possess restriction site only in cattle (198 and 252 bp) and pig (389 and 61 bp) but not in other species studied that enabled development of an RFLP technique for the identification of beef and pork simultaneously. The PCR-RFLP technique was found applicable even in the cooked and admixed meat samples.

224. Kumar, Vijay; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division. Chakravarty, A.K.; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division. Shivahre, Pushp Raj; National Dairy Research Institute, Karnal (India). Dairy Cattle Breeding Division.. Performance of Murrah Buffaloes under network project on Buffalo improvement.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.22-24 KEYWORDS: WATER BUFFALOES. PERFORMANCE TESTING. MILK YIELD.

Data on first lactation traits of 832 Murrah buffalo sired by 95 bulls of Network Project on Murrah buffalo Improvement, spread over a period of 14 years from 1995 to 2008, were used for the study. The overall mean age at first calving and first service period of Murrah buffaloes were estimated as  $44.14 \pm 0.23$  months and  $202.27 \pm 5.36$  days. The overall mean first lactation 305-day or less milk yield, total milk yield and 305-day wet average in Murrah buffaloes were estimated as  $1775.39 \pm 17.17$  kg,  $1947.08 \pm 22.86$  kg and  $6.18 \pm 0.05$  kg. In the present study it was observed that minimum first lactation monthly test-day milk yield (TDMY) was found to be  $4.22 \pm 0.07$  kg on test-day 11 while maximum TDMY was found as  $7.47 \pm 0.07$  kg on test-day 3.

225. Muralidhran, K.; Tamil Nadu veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Physiology. Eswari, S.; Tamil Nadu veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Physiology. Vijayarani, K.; Tamil Nadu veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Physiology.. Altered time dependent mRNA expression of GDF-9 and BMP-15 using reverse transcriptase-PCR from Buffalo COCs during IVM.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.45-48 KEYWORDS: RNA. REVERSE TRANSCRIPTASE. PCR. WATER BUFFALOES.

Growth Differentiation Factor (GDF-9) and Bone Morphogenetic Protein (BMP-15) genes are involved in the regulation of folliculogenesis. This study determines the expression of these two genes during in vitro maturation (IVM) at different time points such as 0 h (immature), 6 h, 12 h and 24 h from buffalo cumulus oocyte complexes using semi-quantitative RT-PCR. The GDF-9 transcripts were detected from cumulus free oocytes during 0 h, 6 h, 12 h and 24 h of in vitro maturation whereas in cumulus cells upto 12 h of maturation. But the mRNA expression of BMP-15 from cumulus free oocytes was detected during all the four mentioned duration points of IVM, but highly transcribed in

immature oocytes and declined during maturation. In case of cumulus cells, BMP-15 transcript was expressed from 0 h upto 12 h and undetectable at 24 h of maturation. This study revealed that both GDF -9 and BMP-15 were expressed in different manner during in vitro maturation of buffalo oocytes.

226. Premavalli, K.; Tamil Nadu Veterinary Sciences University, Chennai(India). Poultry Research Station.Ashok, A.; Tamil Nadu Veterinary Sciences University, Chennai (India). Poultry Research Station. Sangilimadan, K.; Tamil Nadu Veterinary Sciences University, Chennai (India). Poultry Research Station.Thyagarajan, D.; Tamil Nadu Veterinary Sciences University, Chennai (India). Poultry Research Station.. A study on seasonal variation in fertility and hatchability performance of Japanese Quail breeders.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.51-53 KEYWORDS: QUAILS. SEASONS. FERTILITY. EGG HATCHABILITY.

Japanese quail hatching eggs collected at four different seasons were incubated to find out the effect of seasonal variations on the fertility and hatchability performance of Japanese quail breeders. Significantly (P 0.01) higher mean per cent fertility, total hatchability, fertile hatchability and lower embryonic mortality were observed in south west monsoon (79.32, 58.32, 73.30 and 21.00) followed by winter (74.13, 50.83, 68.61 and 23.29), north east monsoon (75.14, 48.06, 63.69 and 27.07) and summer (69.36, 40.68, 58.28 and 28.68) respectively. It can be concluded that better hatching performance of Japanese quail was observed during south west monsoon, followed by winter, north east monsoon and summer seasons respectively.

227. Mitra Susweta, Das; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Das, Wilfred Anthony; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Tewari, Rituparna; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Venugopal Nimita, C; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Mani, Bhuvana; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Natesan, Krithiga; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics. Shome, Bibek Ranjan; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.Rahman, Habibur; ICAR, Yelahanka (India) National Institute of Veterinary Epidemiology and Disease Informatics.. Duplex PCR for specific detection of *Escherichia coli* and its differentiation from other *Enterobacteriaceae*.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.832-835 KEYWORDS: PCR. *ESCHERICHIA COLI*. *ENTEROBACTERIACEAE*.

*Escherichia coli* is a normal inhabitant of gastrointestinal tract of humans and animals and one of the most important causes of bovine mastitis. Definitive identification of *E. coli* from other members of *Enterobacteriaceae* remains ambiguous. The present study describes a duplex PCR, targeting 2 housekeeping genes, the *lacZ* (lactose permease) and *phoA* (alkaline phosphatase) for the reliable detection of *E. coli* that enables its differentiation from biochemically and phylogenetically related bacteria. The assay was evaluated employing 19 ATCC (American type culture collection) reference strains of *Enterobacteriaceae* family. Validation of the assay with *E. coli* (154) isolated from milk and faeces rendered the assay to be specific. The results suggest that the technique can be used for accurate detection of *E. coli* and thus

can be adapted for testing bacteriological safety of milk, for field applications, and in laboratories handling clinical samples. This PCR (polymerase chain reaction) can successfully distinguish *E. coli* including *E. coli* 0157 from *Shigella spp* and other related *enterobacteria*, emphasizing its relevance and utility in studies related to *E. coli* infection.

228. Sudan, Vikrant; Indian Veterinary Research Institute, Izatnagar (India).Tewari, A.K.; Indian Veterinary Research Institute, Izatnagar (India).Singh, Harkirat; Indian Veterinary Research Institute, Izatnagar (India). Molecular cloning and prokaryotic expression of truncated surface antigen protein (SAG1) of *Toxoplasma gondii*.Indian Journal of Animal Sciences (India). (Aug 2015) v.85 (8) p.836-839 KEYWORDS: CLONING. ANTIGENS. PROTEINS. *TOXOPLASMA GONDII*.

The WHO guidelines on control strategies, especially of food-borne diseases, insist on mandatory systematic serological investigations of the causative agent(s) at the farm level and in slaughtered animals for serodetection purposes. Amongst the several target molecules for sensitive detection of *Toxoplasma gondii*, surface antigens are considered important as these are always exposed to host's cellular immune response. The communication deals with the molecular cloning, prokaryotic expression and purification of SAG I, a surface antigen protein, from standard RH strain of *T gondii*. Accordingly, the SAG I protein (mature) was subsequently expressed in prokaryotic expression system. It had molecular size of --47 kDa and the level of expression was measured as 42% of the total protein. The concentration of the mature recombinant SAG I protein was 0.678mg/ml. Western blot with Ni-NTA anti-histidine HRPase conjugate confirmed the presence and purity of protein by immunoreactivity at the unique --47 kDa region.

229. Jha, Dilip Kumar; Birsa Agricultural University, Ranchi (India).College of Veterinary Science & Animal Husbandry. AICRP on Poultry Breeding.Prasad, Sushil; Birsa Agricultural University, Ranchi (India). College of Veterinary Science & Animal Husbandry. AICRP on Poultry Breeding.Singh, Amit Ranjan Kumar; Birsa Agricultural University, Ranchi (India). College of Veterinary Science & Animal Husbandry. AICRP on Poultry Breeding.Patel, Nishant; Birsa Agricultural University, Ranchi (India). College of Veterinary Science & Animal Husbandry. AICRP on Poultry Breeding.. Evaluation of Dahlem Red and Hazra crosses chicken reared under intensive system of management.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31 (1-2) p.16-19 KEYWORDS: CHICKENS. EGG HATCHABILITY. MORTALITY. MANAGEMENT.

A study was conducted to evaluate the production performance of crosses of Dahlem Red and local Hazra birds under intensive system of management. All chicks were brooded up to two months of age under deep litter system and there after transfer in cages and reared under similar management and environment for 72 weeks. There is significant variation in growth rate, age at sexual maturity, egg production, egg weight and mortality pattern of crosses compare to their parent birds. The crosses showed significantly (PO.05) higher body weight, higher feed intake, better egg production rate, large egg size, higher egg weight and early sexual maturity than local Hazra birds under same system of management.

230. Kumar, Vijay; NDRI, Karnal (India). Dairy Cattle Breeding Division. Chakravarty, A.K.; NDRI, Karnal (India). Dairy Cattle Breeding Division.Shivahre, Pushp Raj;



NDRI, Karnal (India). Dairy Cattle Breeding Division.. Rank correlation study of test-day and lactation models of size evaluation in Murrah Buffalo.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.74-75 KEYWORDS: LACTATION. WATER BUFFALOES. MILK YIELD.

An attempt is made in the present study to investigate efficiency of test-day model (TDM) compared to lactation model (LM) for genetic evaluation of Murrah buffalo bulls. Use of TDM instead of LM is of more interest in genetic evaluation because of variability of lactation days in dairy animals. An attempt is being made in the present investigation to compare the ranks of Murrah bulls through SRLS method for FL305DMY and FLMTD6MY. The rank correlations between two traits were statistically significant indicating that FLMTD6MY equally effective to discriminate amongst sires.

231. Singla, S.K.; NDRI, Karnal (India). Animal Biotechnology Centre. Selokar, N.L.; Central Institute for Research on Buffaloes, Hisar (India). Animal Physiology and Reproduction Division.Saini, M.;Central Institute for Research on Buffaloes, Hisar (India). Animal Physiology and Reproduction Division.Palta, P.; NDRI, Karnal (India).Animal Biotechnology Centre.Chauhan, M.S.; NDRI, Karnal (India).Animal Biotechnology Centre.Manik, R.S.; NDRI, Karnal (India). Animal Biotechnology Centre.. Buffalo cloning : what we have achieved so far. Current Science (India). (25 Aug 2015) v109(4) p.670-671 KEYWORDS: CLONING. WATER BUFFALOES. TECHNOLOGY.

232. Priyadarshi, Himanshu; Central Institute of Fisheries Education, Mumbai (India).Das, Rekha; Central Institute of Fisheries Education, Mumbai (India).Kumar, Pavan A.; Central Institute of Fisheries Education, Mumbai (India).Babu Gireesh, P.; Central Institute of Fisheries Education, Mumbai (India).Javed, Hasan; Central Institute of Fisheries Education, Hoshangabad (India).Krishna, Gopal; Central Institute of Fisheries Education, Mumbai (India).Marappan, Makesh; Central Institute of Fisheries Education, Mumbai (India).Chaudhari, Aparna; Central Institute of Fisheries Education, Mumbai (India).. Characterization and evaluation of selected house-keeping genes for quantitative RT-PCR in *Macrobrachium rosenbergii* morphotypes.. Fishery Technology (India). (Jul 2015) v52(3) p.177-183 KEYWORDS: EVALUATION. HOUSING. GENES. PCR. MACROBRACHIUM.

*Macrobrachium rosenbergii* (De Man, 1879) is an important freshwater prawn cultured globally and is known to exhibit three male morphotypes with differential growth rates. Several gene expression studies using qRT-PCR have been undertaken in this species using any one of the popularly used internal control genes. Here we evaluate four house-keeping genes namely EF1a, GAPDH,  $\beta$ -actin and 18S rRNA for transcript stability across various *M. rosenbergii* tissues in male morphotypes for use as internal control genes in expression studies. Expression of these genes was measured in 5 tissues (androgenic gland, gill, eyes, stalk, nerve cord and testis) across morphotypes and Ct values were analyzed using four statistical methods (L<sup>1</sup>Ct, geNorm, BestKeeper and NormFinder) developed for this purpose. We report that EF1a is the most suited internal control for data normalization in androgenic gland, testis, nerve cord and gills while GAPDH is best for eyestalk tissue of *M. rosenbergii* irrespective of the morphotype. Wherever two reference genes are required actin can be included for all the tissues except in nerve cord, where GAPDH is more suitable second reference gene. *M. rosenbergii* EF1a and GAPDH

partial mRNA sequences were also generated as part of this study and their phylogenetic relation with other decapods is also reported.

233. Priyadarshi, Himanshu; Central Institute of Fisheries Education, Mumbai (India). Das, Rekha; Central Institute of Fisheries Education, Mumbai (India). Kumar, Pavan A.; Central Institute of Fisheries Education, Mumbai (India). Babu Gireesh, P.; Central Institute of Fisheries Education, Mumbai (India). Javed, Hasan; Central Institute of Fisheries Education, Hoshangabad (India). Krishna, Gopal; Central Institute of Fisheries Education, Mumbai (India). Marappan, Makesh; Central Institute of Fisheries Education, Mumbai (India). Chaudhari, Aparna; Central Institute of Fisheries Education, Mumbai (India). Characterization and evaluation of selected house-keeping genes for quantitative RT-PCR in *Macrobrachium rosenbergii* morphotypes. *Fishery Technology (India)*. (Jul 2015) v52 (3) p.177-183 KEYWORDS: EVALUATION. HOUSING. GENES. PCR. MACROBRACHIUM.

*Macrobrachium rosenbergii* (De Man, 1879) is an important freshwater prawn cultured globally and is known to exhibit three male morphotypes with differential growth rates. Several gene expression studies using qRT-PCR have been undertaken in this species using any one of the popularly used internal control genes. Here we evaluate four house-keeping genes namely EF1a, GAPDH, actin and 18S rRNA for transcript stability across various *M. rosenbergii* tissues in male morphotypes for use as internal control genes in expression studies. Expression of these genes was measured in 5 tissues (androgenic gland, gill, eyes stalk, nerve cord and testis) across morphotypes and Ct values were analyzed using four statistical methods (L1Ct, geNorm, BestKeeper and NormFinder) developed for this purpose. We report that EF1a is the most suited internal control for data normalization in androgenic gland, testis, nerve cord and gills while GAPDH is best for eyestalk tissue of *M. rosenbergii* irrespective of the morphotype. Wherever two reference genes are required  $\beta$ -actin can be included for all the tissues except in nerve cord, where GAPDH is more suitable second reference gene. *M. rosenbergii* EF1a and GAPDH partial mRNA sequences were also generated as part of this study and their phylogenetic relation with other decapods is also reported.

234. Babu, Suresh P.P.; ICAR-Central Marine Fisheries Research Institute, Kozhikode (India). Shankar, K.M.; College of Fisheries, Mangalore (India). Dept. of Aquaculture. Fish Pathology & Biotechnology Laboratory. Honnananda, B.R.; Chhattisgarh Kamdhenu Vishwavidyalaya, Kabirdham (India). College of Fisheries. Dept. of Aquaculture. Abhiman, P.B.; College of Fisheries, Mangalore (India). Dept. of Aquaculture. Fish Pathology & Biotechnology Laboratory.. Application of monoclonal antibody based ELISA for determining circulation specific antibody in Rohu (*Labeo rohita*). *Fishery Technology (India)* (Jul 2015) v52(3) p.202-204 KEYWORDS: MONOCLONAL ANTIBODIES. ELISA. LABEO ROHITA.
235. Samal, Ashabaree; Indian Veterinary Research Institute, Izatnagar (India). Verma, Rishendra; Indian Veterinary Research Institute, Izatnagar (India). Upmanyu, Vikramaditya; Indian Veterinary Research Institute, Izatnagar (India). Verma, Harshit; Indian Veterinary Research Institute, Izatnagar (India). Molecular cloning and expression of MPT63 gene of *Mycobacterium tuberculosis*. *Indian Journal of Animal Sciences (India)*. (Sep 2015) v85(9) p.947-953 KEYWORDS: MOLECULAR

#### CLONING. GENES. MYCOBACTERIUM TUBERCULOSIS.

The present investigation was undertaken to amplify, clone and express MPT63 gene of *Mycobacterium tuberculosis* to discern this secretory protein as a potent diagnostic and immunogenic antigen. Primer specific for MPT63 gene with restriction enzyme sites, viz BamHI and HindIII were designed. MPT63 gene was amplified using DNA from *M. tuberculosis* 198/94 (IVRI) strain, with designed primers by polymerase chain reaction (PCR). The 412 bp amplicon was purified and first cloned into pGEM-T vector. Positive clone was confirmed by colony PCR and restriction enzyme digestion. The pGEM-T released insert was ligated with BamHI and HindIII digested pET32b expression vector using T4 DNA ligase and transformed into *Escherichia coli*. Recombinant clones were selected by colony PCR and restriction enzyme digestion and induced with 1mM final concentration of Isopropyl-β-D-thiogalactopyranoside (IPTG) for expression of the recombinant MPT63 protein. The expressed protein of 33 kDa was obtained during 2h post induction. Western blot with Ni-NTA anti-histidine HRP conjugate and hyperimmune serum raised in rabbits confirmed the presence and purity of recombinant MPT63 protein by immuno reactivity at the unique 33 kDa region. Further confirmation of recombinant protein was done by dot blot and indirect ELISA using rabbit hyperimmune serum. The recombinant MPT63 protein was evaluated as a skin test antigen to produce delayed type hypersensitivity reaction in guinea pigs. Recombinant MPT63 protein produced skin erythema of 3 to 4 mm diameter in guinea pigs sensitized with killed *M. tuberculosis* and *M. bovis* culture. From the present study, it may be concluded that understanding of the immunogenic components of an infectious agent is essential through molecular characterization, in regard to the serological diagnosis, and the development of strategies for efficient immune protection and eradication of the disease.

236. Verma, Mohit; Narendra Dev University of Agriculture and Technology, Kumarganj (India). Joshi, Namita; Narendra Dev University of Agriculture and Technology, Kumarganj (India). Rathore, R.S.; Indian Veterinary Research Institute, Izatnagar (India). Mohan, H.V.; Indian Veterinary Research Institute, Izatnagar (India). Detection of *Arcobacter spp* in poultry, pigs their meat and environment samples by conventional and PCR assays.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.954-957 KEYWORDS: PATHOGENS. POULTRY. SWINE. MEAT. PCR.

Samples (300) comprising poultry and pig faeces, meat, poultry intestinal contents and environmental samples were investigated bacteriologically for the presence of *Arcobacter spp*. On the basis of morphology and biochemical tests, 34 (11.33%) of the isolates were identified as *Arcobacter*. The isolates grew at 28°C aerobically but failed to grow at 42°C. *Arcobacters* were differentiated from closely related campylobacters by their ability to grow in aerobic condition and negative for hippurate hydrolysis test. The genus specific amplification of 16S rRNA gene by PCR gave an amplification product of 1223 bp in all 34 presumptive *Arcobacter* isolates. The highest rate of *Arcobacter* isolation was from poultry meat samples (18%) followed by poultry environmental samples (16%), poultry intestinal contents (13.33%), poultry faecal (10%), pork (10%) and pig faecal (8%) and no arcobacters could be isolated from the pig environments. Multiplex PCR (m-PCR) targeting for 16S rRNA and 23S rRNA genes detected *A. butzleri* (12), *A. skirrowii* (6) and *A. cryaerophilus* (4). However, some of isolates showed mixed culture of both *A. butzleri* and *A.*

skkirrowii (5), A. skkirrowii and A. cryaerophilus (4) and A.butzleri and A. cryaerophilus (3).

237. Mahesh, Dige S.; Indian Veterinary Research Institute, Izatnagar(India).Kumar, Pushpendra; Indian Veterinary Research Institute,Izatnagar (India).Kumar, Amit; Indian Veterinary Research Institute, Izatnagar (India).Sonwane, Arvind; Indian Veterinary Research Institute, Izatnagar (India).Kumar, Gandham Ravi; Indian Veterinary Research Institute, Izatnagar (India).Kashyap, Neeraj; Indian Veterinary Research Institute, Izatnagar (India).Bhatt, Sandeep;Indian Veterinary Research Institute, Izatnagar (India).Sharma,Deepak; Indian Veterinary Research Institute, Izatnagar (India).Genetic polymorphism and expression analysis of leptin gene in rabbit.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9)p.972-978 KEYWORDS: DNA. POLYMORPHISM. ANALYTICAL METHODS. GROWTH.BLOOD PROTEINS. GENES. RABBITS.

Leptin plays an important role in the regulation of feed intake,energy metabolism, growth and reproduction of rabbit. We used the polymerase chain reaction- single stranded confirmation polymorphism (PCR-SSCP) technique to screen for DNA polymorphisms of the leptin gene in 150 New Zealand White rabbits. In all the New Zealand White rabbits, we amplified different regions of the leptin gene. PCR-SSCP of all these fragments revealed monomorphic pattern. All the amplified fragments of leptin gene were monomorphic, which is in contradiction to many earlier reports of mammalian species. All the fragments were sequenced and compared with the available sequences of different species. The nucleotide sequence analysis indicated that the per cent similarity of leptin gene fragments of New Zealand White rabbit with rat, mouse, cattle and pig was 79.6-87.5%. At various places, the amino acids and protein were different in New Zealand White rabbit as compared to rat, mouse, cattle and pig. For relative quantification, total RNA was isolated from liver tissues collected at 2 different stages of growth i.e. pre-weaning and post-weaning.Our results indicate no significant differences in the mRNA expression of leptin between two different stages of growth.

238. Padhi, M.K.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).Chatterjee, R.N.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).Haunshi, S.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).Rajkumar, U.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).Niranjan, M.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).Rajaravindra, K.S.; ICAR- Directorate on Poultry Reseach, Hyderabad (India).. Evaluation of four different crossbreds developed for backyard poultry farming under intensive system.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.985-990 KEYWORDS: BODY WEIGHT. CROSSBREDS. POULTRY. EGG PRODUCTION.

In the present study, 4 new crosses, viz. PD I x PD4 (A), PD 1 xPB2 (B), PD I x PD3 (C) and PD I x IWI (D) were developed and evaluated under intensive system of rearing. Body weights, conformation traits were evaluated during starter and growing period and production performance were measured up to 72 weeks of age. Body weights at day 0, 2, 4, 6, 7 and 8 weeks of age in the starter period and at 10, 12, 14, 16,18 and 20 weeks of age during growing period differed significantly between crosses in both male and female.Irrespective of age, cross B recorded higher body weight compared to other crosses. Shank length and keel length measured at 6,8, 18 and 20 weeks of age in both the sexes differed significantly between the crosses. The maximum

shank and keel lengths were achieved by 20 weeks of age. Feed conversion ratio (FCR) from 0-8 weeks of age was the best in B followed by A, C and D. The age at sexual maturity (ASM), weight at sexual maturity, body weight and shank length at 40 weeks of age, egg production up to 72 weeks of age differed significantly between different crosses. Egg weights measured at different weeks of age also differed significantly between the crosses. The egg production up to 72 weeks of age was the highest in C followed by D,A and B. Mortality % was lowest in D at different period. The results indicated that B may be useful for coloured meat type birds in rural areas whereas C and D cross may be useful for egg type as well as dual purpose backyard poultry. Cross A may be useful for dual type backyard poultry.

239. Padhi, M.K.; ICAR-Directorate of Poultry Research, Hyderabad (India).Chatterjee, R.N.; ICAR-Directorate of Poultry Research, Hyderabad (India).Haunshi, S.; ICAR-Directorate of Poultry Research, Hyderabad (India).Rajkumar, U.; ICAR-Directorate of Poultry Research, Hyderabad(India).Bhattacharya, T.K.; ICAR-Directorate of Poultry Research,Hyderabad (India).Bhanja, S.K.; ICAR-Directorate of Poultry Research, Hyderabad (India).. Evaluation of male line of Vanaraja (PD1), Vanaraja and control broiler in respect to juvenile traits and genetic analysis of juvenile traits in PD1.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.991-995 KEYWORDS: POULTRY. BODY WEIGHT. HERITABILITY. BROILER CHICKENS.

Present study was undertaken to compare the male line of Vanaraja, Vanaraja and control broiler in respect to their juvenile traits and to study the genetic parameters in Vanaraja male line (PDI). Body weight, feed conversion, conformation traits and carcass quality were measured. Body weights showed significant difference between different genetic groups and lowest body weight recorded in Vanaraja followed by PDI and control broiler. The gain in body weights at 2 weeks interval showed significant difference between genetic groups and also differ significantly at different periods within a genetic group. All the conformation traits studied showed significant differences between genetic groups and for increase in shank and keel length during different periods. FCR was significantly better in PD I and control broiler than Vanaraja. Carcass quality traits measured at 12 weeks of age showed significant difference for abdominal fat% and back+neck% between PDI and Vanaraja. Vanaraja recorded significantly lower abdominal fat% compared to PDI.Heritability estimates for juvenile body weights in PDI were moderate in magnitude. All conformation traits showed low to moderate estimates of heritability in magnitude for the traits measured at different ages. Correlations for body weights with different conformation traits were high in magnitude. Correlations between the same traits measured at different weeks showed positive and high correlation. The results revealed that the selection in PD I may improve the performance of the line and also improve the performance in Vanaraja which is being used as dual purpose backyard poultry through utilization of heterosis for different traits.

## **L20 Animal ecology**

240. Kumar, Pravendra; CCS Meerut University, Meerut (India).Singh, Rajbir; CCS Meerut University, Meerut (India).Panwar Pratap, Singh;CCS Meerut University, Meerut (India).. Status of nutritional practices for domestic cows in rural ecology of north-western Indo-Gangetic plains.. Indian Journal of Animal Sciences (India).

(Jul 2015) v.85(7) p.781-785 KEYWORDS: COWS. NUTRITION SURVEYS. RURAL AREAS. ECOLOGY. LIVESTOCK NUMBERS.

Data congregated on 150 households from 15 ecosystems in rural area of Baghat district of north-western Indo-Gangetic plains. The overall body weight of cows was  $376.1 \pm 8.8$  kg and overall daily milk yield was  $4.76 \pm 0.08$  kg. On an average, a cow requires  $9.4 \pm 0.09$  kg dry matter daily; whereas, only  $8.46 \pm 0.07$  kg dry matter could be supplied leaving a 10 % deficiency of dry matter, which was significantly affected by the lactation order. The daily digestible crude protein (OCP) availability to a cow were  $0.47 \pm 0.008$  kg and  $0.43 \pm 0.005$  kg indicating a deficiency of 0.04 kg OCP/ day/ cow. The requirement as well as availability of OCP for cows was affected significantly by lactation order. The requirement and availability of total digestible nutrients (TON) were  $4.47 \pm 0.10$  kg and  $3.96 \pm 0.05$ kg/day for cows, showing a deficiency of 8.85 %. The lactation order and herd size affected significantly the requirement as well as the availability of TON for cows.

241. Lalremruata, C.; Assam Agricultural University, Khanapara (India).College of Veterinary Sciences. Dept. of Livestock Production and management.Sahar, J.; Assam Agricultural University, Khanapara(India). College of Veterinary Sciences. Dept. of Livestock Production and management.Borah, M.C.; Assam Agricultural University, Khanapara (India). College of Veterinary Sciences. Dept. of Livestock Production and management.Sarma, N.K.; Assam Agricultural University, Khanapara (India). College of Veterinary Sciences. Dept. of Livestock Production and management.Roychoudhury, R.; Assam Agricultural University, Khanapara (India). College of Veterinary Sciences. Dept.of Livestock Production and management.. Effect of climate on litter traits of crossbred pigs in Mizoram.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.51-56 KEYWORDS: SWINE. LITTER SIZE. PERFORMANCE TESTING.

A study on seasonal effect of climate on the litter traits of cross bred pigs was undertaken in different districts of Mizoram such as Aizawl, Lunglei, Champhai and Kolasib. Data of 11 years i.e.January 2002 to December 2012 was collected from a total of 11,376 animals. Meteorological data was also collected from MIRSAC. The average litter size at birth Lalremruata et al. ranges from  $6.469 \pm 0.15$  to  $6.853 \pm 0.15$  and litter weight from  $7.100 \pm 0.20$  to  $7.843 \pm 0.19$  kg. However, there was non-significant difference between litter traits at the time of piglet birth in different seasons.However, at the time of weaning, average litter size ranges from  $5.484 \pm 0.14$  to  $5.995 \pm 0.14$  and litter weight ranges from  $49.92 \pm 1.28$  to  $55.27 \pm 1.20$  kg. There was significant differences in litter size at weaning (PO.05) as well as litter weight at weaning (PO.01). This indicates that season has significant effect on litter traits at the time of weaning.

#### **L40 Animal structure**

242. Yadav, Shivchand; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). College of Veterinary and Animal Science.Dept. of Veterinary Anatomy.Joshi, Sanjeev; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). College of Veterinary and Animal Science. Dept. of Veterinary Anatomy.Mathur,Rakesh; Rajasthan University of Veterinary and Animal Sciences,Bikaner (India). College of Veterinary and Animal Science. Dept. of Veterinary Anatomy.Choudhary, Om Prakash; Rajasthan University of Veterinary and Animal Sciences, Bikaner (India). College of Veterinary and Animal Science.

Dept. of Veterinary Anatomy. Morphometry of tarsal and metatarsal of Indian Spotted Deer (*Axis axis*). Indian Veterinary Journal (India). (Sep 2015) v92(09) p.43-46 KEYWORDS: CERVIDAE. LIMB BONES. DIMENSIONS.

The tarsus consisted of five bones i.e., tibial tarsal, fibular tarsal, fused central and fourth tarsal, first tarsal and fused second and third tarsal. The tibial tarsal was the medial bone of the proximal row. Fibular tarsal was the largest bone of the tarsus. The central and the fourth tarsals were fused together to form a large single bone. The first tarsal was a quadrilateral piece of bone. The second and third fused tarsal bone was a small, flattened plate of bone. The large metatarsal bone was quadrilateral in form, the shaft was four sided. The medial small metatarsal bone was four sided and disc-like.

## **L50 Animal physiology and biochemistry**

243. Vaidya Mangesh, M.; ICAR, Karnal (India). National Dairy Research Institute. Singh Sohan, Vir; ICAR, Karnal (India). National Dairy Research Institute. Beenam; ICAR, Karnal (India). National Dairy Research Institute. Upadhyay Ramesh, C.; ICAR, Karnal (India). National Dairy Research Institute.. Plasma profile of hormones and energy metabolites during periparturient period in low and high producing Karan Fries (Holstein Friesian \* Tharparkar) cows during different seasons.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.736-743 KEYWORDS: BLOOD PROTEINS. METABOLITES. PERINATAL PERIOD. COWS.

In order to find out the hormonal and metabolic profile during summer and winter season, five each of periparturient high and low yielding Karan Fries cows were selected from Livestock Research Centre (LRC) of ICAR-NDRI, Karnal. Blood samples were collected from both the group of animals on days (-45, -30, -15) of prepartum, 0 (expected day of calving) and on 15th, 30th and 45th day of postpartum during both the seasons. Plasma was separated by centrifuging the blood samples in the refrigerated centrifuge for energy metabolites and hormones. The plasma glucose levels were significantly lower on 0 day and remains lower upto 45th day of postpartum in both the groups and seasons compared to prepartum period (45 days). The plasma NEFA levels in high yielder group and during summer were higher on 15th day of postpartum compared to low yielders and during winter respectively. The plasma cortisol levels were significantly higher on the day of calving in high yielding group of Karan Fries cows compared to low yielding group animals. Plasma cortisol levels were significantly higher on the day of calving and remain higher during postpartum period (upto 45 days) in both groups and seasons compared to prepartum period. On the day of calving, plasma insulin, T3, T4 and leptin levels were significantly lower in high yielding group compared to low yielding group during both the seasons. The results of the present study clearly indicate more fluctuations in different stress markers in high yielding group compared to low yielding group during summer season. Although, both the groups of crossbred cows required protection during extreme climatic conditions, but high yielders group will require extra protection during the climate change scenario in future. Therefore, special care needs to be given to manage the high yielding animals during periparturient period to improve/maintain the productivity.

244. Singh, Yajuvendra; ICAR, Karnal (India). National Dairy Research Institute. Lathwal, S.S.; ICAR, Karnal (India). National Dairy Research Institute. Devi, Indu; ICAR, Karnal (India). National Dairy Research Institute. Ruhil,

A.P.; ICAR, Karnal (India). National Dairy Research Institute. Rajput, N; ICAR, Karnal (India). National Dairy Research Institute. Raja, T.V.; ICAR, Karnal (India). National Dairy Research Institute. Kumar, M.; ICAR, Karnal (India). National Dairy Research Institute. Gupta, R.K.; ICAR, Karnal (India). National Dairy Research Institute.. Bio-acoustic: A non-invasive and effective sensing technique in monitoring of dairy buffaloes.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.744-750 KEYWORDS: ACOUSTIC PROPERTIES. WATER BUFFALOES. MONITORING.

The present study was performed to observe the significant effect of individuality of dairy buffaloes on the acoustic features of their vocal signals. The mean call duration, pitch, 1<sup>st</sup> formant, periodicity and degree of voice breaks of adult lactating Murrah buffaloes were observed to be  $2.15 \pm 0.05$  s,  $143.48 \pm 2.51$  Hz,  $900.11 \pm 4.21$  Hz, 95.31% (183.95 periodic pulses out of 192.99 pulses) and  $20.78 \pm 0.89$  % respectively. Analysis of bioacoustics features extracted from 300 voice samples of 10 adult lactating Murrah buffaloes revealed that differences for amplitudes (minimum, maximum and mean), total energy, mean power, pitch (median, minimum, range and mean), intensities (mean, minimum and maximum), formants (F1, F2, F3, F4 and F5), bandwidths (B1, B3 and B4), number of pulse, number of period, mean period, unvoiced frames, degree of voice breaks, jitter, shimmer, mean noise to harmonic ratio (%) and mean harmonic to noise ratio (dB) were highly significant. Out of these only few acoustic features viz. formants (F1, F2, F3, F4 and F5), number of pulse, number of period, degree of voice breaks, mean noise to harmonic ratio (%) and mean harmonic to noise ratio (dB) were observed to have significant difference for each and every individual dairy buffalo, hence only these features could be selected as the best suited acoustic features for discrimination of individual Murrah buffaloes from their herd.

245. Singh, Jagmohan; College of Veterinary Sciences & Animal Husbandry, Anjora (India). Department of Veterinary Pharmacology and Toxicology. Koley, K.M.; College of Veterinary Sciences & Animal Husbandry, Anjora (India). Department of Veterinary Pharmacology and Toxicology. Nety, S.; College of Veterinary Sciences & Animal Husbandry, Anjora (India). Department of Veterinary Pharmacology and Toxicology. Chandrakar, Khushboo; College of Veterinary Sciences & Animal Husbandry, Anjora (India). Department of Veterinary Pharmacology and Toxicology.. Effects of *Cajanus Indicus* on dressing percentage and haemato-biochemical parameters of Broiler Chickens.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.53-55 KEYWORDS: CAJANUS CAJAN. DRESSING PERCENTAGE. BIOCHEMICAL REACTIONS. CHICKENS.

Total 90 Ven Cobb broiler chicks were used in this experiment, allocated in three groups, having 3 replicate each. Group T1 received basal diet; group T2 received an antibiotic growth promoter 0.05% in feed and group T3 was provided *Cajanus indicus* leaf powder (CLP) at rate of 2% in feed. At the end of sixth week dressing percentage of the groups T1, T2 and T3 were  $72.49 \pm 1.57$ ,  $71.95 \pm 0.43$  and  $72.67 \pm 1.15$ , respectively. No significant (P0.05) differences were observed amongst all the groups. There were no significant (P0.05) differences in the value of MCV, MCH, MCHC, TLC and DLC (Lymphocyte, Heterophil, Monocyte, Eosinophil and Basophil) amongst all the groups.

246. Narute, H.S.; College of Veterinary and Animal Sciences, Udgir (India). Department of Animal Nutrition. Kanduri, A.B.; College of Veterinary and Animal



Sciences, Udgir (India). Department of Animal Nutrition.Patil, P.V.; College of Veterinary and Animal Sciences, Udgir (India). Department of Animal Nutrition.Khan, M.A.; College of Veterinary and Animal Sciences, Udgir (India). Department of Animal Nutrition.. Effect of herbal combination on the haematological and serum biochemical profile of Osmanabadi Goat kids.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.59-61 KEYWORDS: BLOOD. BIOCHEMICAL REACTIONS. GOATS.

The present study was conducted to assess the effect of herbal combination on the hematological and serum biochemical profile of Osmanabadi goat kids. Twenty four goat kids were equally divided in three group and the kids were reared in intensive system with similar managemental practices for all the three groups. All the three groups were fed with farm made concentrate mixture. In addition to this Group- II was supplemented with Combination of herbs and Group-III was supplemented with another Combination of herbs 500 gm/ tonne of feed for 120 days. The blood samples were collected fortnightly intervals from 1 st fortnight to 8th fortnight of study. The values on hematological and serum biochemical estimations revealed that the supplementation of herbal combination had no adverse effect on hematological and serum biochemical profile.

247. Chandra, V.; Nanaji Deshmukh Veterinary Science University, Jabalpur (India)Shukla, S.N.; Nanaji Deshmukh Veterinary Science University, Jabalpur (India)Kumar, P.R.; Nanaji Deshmukh Veterinary ScienceUniversity, Jabalpur (India)Shrivastava, O.P.; Nanaji Deshmukh Veterinary Science University, Jabalpur (India)Quadri, M.A.; Nanaji Deshmukh Veterinary Science University, Jabalpur (India). Fertility response on intrauterine administration of lochial extracts in postpartum diary buffaloes.. Indian Journal of Animal Sciences(India). (Aug 2015) v.85(8) p.849-852 KEYWORDS: BACTERIA. BIOCHEMISTRY. WATER BUFFALOES. PERINATAL PERIOD. PROGESTERONE.

The present investigation aimed to assess the effect of intrauterine administration of lochial extract on fertility, uterine bacterial load, serum biochemical and hormonal profiles in postpartum buffaloes. Therefore, experiment was conducted in 30 postpartum buffaloes, randomly divided into 3 groups (10 each). Animals of G 1 received PBS (30 ml) however, in G 2, Lochial extract (30 ml) and inG 3, gentamicin (200 mg) were given as intrauterine infusion on day 15 postpartum. Fertility was ascertained in terms of uterine involution, induction of estrus and conception rate. Bacterial load in uterine contents, serum progesterone, calcium and phosphorus concentrations were also studied before and after the treatments. The uterine involution within 30 days postpartum was highest in both groups 2 and 3 (80% in each). The oestrus induction within 60 days postpartum was also highest in both groups 2 and 3 (60% in each). The conception rate at induced estrus was recorded higher (100%) in lochial extract group followed by gentamicin (83.33%) and control (75%) group. No significant differences were observed in the data of fertility responses. There was significant reduction in bacterial load after treatment in both the treated groups. However, no significant difference was recorded in serum progesterone, calcium and phosphorus neither within the group nor among the groups before and after treatments. Overall results of the present study revealed better and comparable fertility with low uterine bacterial load in postpartum buffaloes administered intrauterine lochial extract and gentamicin.

248. Mili, Bhabesh; National Dairy Research Institute, Karnal (India) Pandita, Sujata; National Dairy Research Institute, Karnal (India). Mohini, Madhu; National Dairy Research Institute, Karnal (India).Kumar, Bharath, B.S.; National Dairy Research Institute, Karnal (India).. Effect of vitamin E supplementation on antioxidant status and selective humoral and cellular immune responses in periparturient buffaloes.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.853-855 KEYWORDS: VITAMIN E. SUPPLEMENTS. ANTIOXIDANTS. HUMORAL IMMUNITY. PERINATAL PERIOD. WATER BUFFALOES.

This study was aimed at assessing the antioxidant status and selective humoral and cellular immune response mediators in periparturient buffaloes supplemented with vitamin E in the feed regularly. Murrah buffaloes (12) were selected during their late gestation from NDRI herd and divided randomly into 2 groups, comprising 6 each. Buffaloes of group 1 were given only the control diet, while group 2 was supplemented with 2,000 IU/day/head vitamin E along with control feed. Blood sample was drawn from each buffalo at weekly interval from day -56 to day +56 relative to parturition by jugular vein- puncture. Nitric oxide (NO) level was quantified using modified Griess reaction whereas IL-6, total antioxidant activity(TAA) and IgG levels were estimated in blood plasma using ELISA kits.TAA and IgG levels increased significantly upon vitamin E supplementation. However, levels of cellular immune response mediators (NO and IL-6) were significantly lowered. Except for plasma NO, the levels of all other mediators declined significantly on the day of calving as compared to prepartum levels in both the groups.TAA was also significantly reduced. The magnitude of decline was significantly greater in group 1. It could be concluded that peripartum supplementation of vitamin E to buffaloes not only improved humoral and cellular immune responses but also enhanced total antioxidant activity.

249. Gain, Swarnaya; West Bengal University of Animal and Fishery Sciences, Kolkata (India).Mukherjee, Joydip; West Bengal University of Animal and Fishery Sciences, Kolkata (India).Chatterjee, Saibal;West Bengal University of Animal and Fishery Sciences, Kolkata (India).Batabyal, Subhashis; West Bengal University of Animal and Fishery Sciences, Kolkata (India).Guha, Chanchal; West Bengal University of Animal and Fishery Sciences, Kolkata (India).Alteration in the activity of blood and milk leukocytes together with the serum enzyme profile during sub-clinical mastitis in cross-bred cows.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8)p.856-860 KEYWORDS: LEUKOCYTES. IMMUNE RESPONSE. MASTITIS. BLOOD PROTEINS.

In vitro activity of blood and milk leukocytes together with serum enzyme profile during sub-clinical mastitis in crossbred cows were evaluated after collection of blood and milk samples from normal (10) and sub-clinical mastitic (10) cows. Blood total leukocyte counts (TLC) and differential leukocyte counts (DLC) were estimated by standard hematological procedure. Milk somatic cell counts (SCC) was performed microscopically. In vitro phagocytic activity of blood and milk neutrophils was performed by colorimetric nitro blue tetrazolium (NBT) assay and mitogen concanavalin A (con A) induced blood and milk lymphocyte blastogenic response was evaluated by colorimetric MTT (tetrazolium) assay. Serum total protein and alkaline phosphatase (ALP) were measured by the standard biochemical methods. The alanine amino transferase (ALT) and aspartate amino transferase (AST) activities in serum were estimated by commercially available kit. Milk SCC was significantly higher in sub-clinical

mastitic cows. Phagocytic index of both blood and milk neutrophils was significantly lower in sub-clinical mastitic cows than normal animals. Con- A induced blood and milk lymphocyte blastogenic response was significantly lowered in sub-clinical mastitic cows than. Serum albumin, globulin ratio decreased significantly during sub-clinical mastitis. Serum AST and ALP level in sub-clinical mastitic cows was significantly higher. The study indicated decreased blood and milk leukocyte activity and higher AST and ALP during the sub-clinical mastitis which could be used as a diagnostic tool for sub-clinical mastitis.

250. Mehta, S.C.; National Research Centre on Camel, Bikaner (India). Sharma, A.K.; National Research Centre on Camel, Bikaner (India). Bissa, U.K.; National Research Centre on Camel, Bikaner (India). Singh, Sajjan; National Research Centre on Camel, Bikaner (India). Lactation persistency, yield and prediction models in Indian dromedary. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.875-882 KEYWORDS: LACTATION. YIELDS. FORECASTING. MODELS. CAMELS.

The demand driven economy is leading to production and utilization of camel milk for nutritional security of the human population. Lactation records (65) of the she-camels belonging to the Bikaneri, Kachchhi and Mewari breeds were analysed. The average daily milk production from 2 teats was  $2.9 \pm 0.04$  litre with  $2.7 \pm 0.05$  litre in Bikaneri,  $3.2 \pm 0.07$  litre in Kachchhi and  $2.6 \pm 0.08$  litre in Mewari breed. The average daily production was  $2.5 \pm 0.07$ ,  $2.8 \pm 0.06$ ,  $3.2 \pm 0.07$  and  $3.0 \pm 0.1$  0 litres respectively in first, second, third and fourth parity. Highest individual average daily milk yield from 2 teats was 8.06 litre. The peak yield was observed in fifth month of lactation. The average lactation yield from 4 teats was estimated to be  $1,883 \pm 75$ ,  $2,239 \pm 88$ ,  $2,520 \pm 100$  and  $3,017 \pm 148$  litre for the lactation length of 10, 12, 14 and 16 months, respectively. Two breeding and milking models were compared. Eleven mathematical functions were fitted for the prediction lactation yield and it was observed that for the sake of simplicity, the linear equation can be utilized for the purpose. The fifth month's average daily yield gave the best predictions. Therefore, the mathematical equation  $Y = 106.727 + 238.597(Y5m)$  can be utilized for prediction of 10 months' lactation yield and respective equations for the lactation yields of 12, 14 and 16 months' lactation. The persistency of lactation was 76.20, 67.07, 55.67 and 35.87% when calculated for lactation length of 10, 12, 14 and 16 months, respectively. The present observations and analyses indicated tremendous scope in dromedary to fulfill the human aspirations which may lead to its sustenance too.

251. Padihari, V.P.; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Tiwari, S.P.; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Sahu, Tarini; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Gendley, M.K.; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Naik, Surendra Kumar; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India).. Influence of mannan-oligosaccharide and *Saccharomyces cerevisiae* on performance, carcass yield and biochemical profile of broiler chickens.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.902-907 KEYWORDS: BIOCHEMICAL REACTIONS. CARCASSES. YIELDS. MANNANS. OLIGOSACCHARIDES. SACCHAROMYCES.

Day old Vencobb broiler chicks (ISO) were randomly allocated to 5 treatment groups with 3 replicates of 10 chicks in each to study the effect of mannan oligosaccharide (MOS) and *Saccharomyces cerevisiae* (SC) on growth performance, nutrient utilization and carcass yield. The trial lasted for 5 weeks.

The starter (0-14 day), grower (14- 28 days), and finisher (28-35 days) diets contained 23, 21.5 and 20% CP and 2,900,3,000 and 3,100 kcal ME/kg feed, respectively. The control (C) group in starter, grower and finisher was supplemented with premix while their negative control (NC), mannan oligosaccharides (MOS), *Saccharomyces cerevisiae* (SC) and mannan oligosaccharides+ *Saccharomyces cerevisiae* (MOS+SC) groups were not supplemented with premix. The later 3 groups were supplemented with MOS 500g/tonne, SC 500g/tonne and MOS+SC 500g+500g/tonne feed, respectively. Maximum conversion of feed into gain was recorded in MOS followed by SC and MOS+SC. The chicks attained relatively more body weight in MOS+SC than other groups. It was least in group C. Phosphorus retention was maximum and significant in MOS+SC in spite of their minimum intakes. There was significant improvement in weight of different cuts in MOS+SC group as compared to other groups. Maximum serum cholesterol, LDL cholesterol and triglyceride was recorded in NC group while in the MOS supplemented treatment serum HDL cholesterol and total protein was maximum. The mean serum glucose, Ca and P was recorded highest in MOS+ SC group. It may be concluded that MOS+SC supplementation in the diet improves the overall FCR and blood biochemical profile of broiler chickens.

252. Senapati, Manas Rajan; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Biochemistry. Behera, Prakash Chandra; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Biochemistry. Maity, Apratim; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Biochemistry. Mandal, Arun Kumar; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Anatomy and Histology. Spleen: an immune tissue in poultry birds - a comparative histological study. *Journal of Interacademia* (India). (Apr 2015) v19(2) p.243-248 KEYWORDS: SPLEEN. IMMUNITY. POULTRY. BIRDS.

The spleen of six adult poultry birds each (quail, broiler chicken and duck) of either sex was studied histo-morphologically for variations in immune tissues. The spleen in quail and chicken was covered by a thin connective tissue capsule interspersed with smooth muscle cells. The spleen of the duck was surrounded by a comparatively thick capsule without any appearance of true trabeculae. The sharply distinguished areas of red and white pulp were better observed in chicken and ducks than in quails. The pale coloured, distinct ellipsoids were distributed throughout the spleen of duck. The white pulps appeared as denser lymphoid tissue and were closely associated with the vascular tree. Prominent lymphatic nodules were observed in white pulps in case of ducks as compared to those of chickens. But such nodules were scanty or even absent in case of quail. Therefore, these lymphatic nodules of spleen of poultry birds could play an important role in immunological surveillance against foreign microorganism.

253. Mili, Minakshi; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Baruah, Anubha; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Bora, Arundhati; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Bhuyan, Dipak; Assam Agricultural University, Khanapara (India). College of Veterinary

Science. Dept. of Veterinary Physiology. Sarma, Satya; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Sarmah, B.C.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Goswami, Jitendra; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Kalita, Dhireswar; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Hussain, Jakir; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology. Deka, Ilakshi; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Veterinary Physiology.. Role of Zinc and Copper ratio on growth in piglets.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.8-10 KEYWORDS: ZINC. COPPER. GROWTH. PIGLETS.

The effect of zinc and copper ratio on body weight gain was studied on 24 healthy crossbred (Hampshire . Assam local) male piglets with similar body weight at 2 months of age which were randomly divided into four groups, viz., Control T; T2 and T3 comprising of 6 piglets in each group. The ratio of zinc and copper supplementation was done to different groups as for T, - 125:12.5ppm; T2 - 150:15 ppm and T3 - 175 : 17.5 ppm. The piglets were kept under intensive system of rearing following all the managemental practices in the farm belonging to AICRP on Pig, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-22. Body weight of each animal of respective groups was measured and blood samples were collected at fifteen days interval beginning from 2 months upto 6 months of age. Serum was separated and stored at -20°C for hormonal estimation. The body weight in all four groups during the trial period clearly revealed that there was gradual increase in the body weight of pigs which was highest (52.70± 0.69 kg) in T3 and lowest (42.90 ± 0.32 kg) in control group. The serum zinc concentration in all four groups during the trial period revealed apparent increase with the highest (0.30 ± 0.03 ppm) in T3 and lowest (0.26 ± 0.03 ppm) in control group. The serum copper concentration was highest (0.25 ± 0.01 ppm) in T3 and lowest (0.21 ± 0.01 ppm) in control group. During the experimental period, there observed a linear increasing trend of serum copper concentration in general irrespective of groups. Supplementation of zinc and copper at 175 ppm: 17.5 ppm per day was found to be beneficial with highest growth.

254. Saikia, Prasanta; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management. Hazarika, Pragati; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management. Rajesh, J.B.; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management. Tolengkomba, T.C.; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management. Himar, Lalnuntluangi; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management. Buragohain, Rajat; Central Agricultural University, Aizwal (India). College of Veterinary Sciences & A.H. Dept. of Livestock Production & Management.. Performance of Mizo local pigs (ZOVAWK) under traditional housing system.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.20-23 KEYWORDS: SWINE. MIZORAM. ANIMAL

#### HOUSING. MORTALITY.

Ten Zovawk (Mizo local pig) female and two male pigs of 151 parity (4-5 months of age) were selected randomly from a sizable population maintained at Instructional Pig Farm of College of Veterinary Sciences & A.H., Aizwal, Central Agricultural University, Mizoram to study the performance under traditional housing system. The body weight changes of piglets up to 12 week of age showed a linear increase in growth. The conception rate in sows was 100%. Litter size at birth and weaning were  $7.3 \pm 0.67$  and  $6.1 \pm 0.71$ , respectively. The overall mortality was 14.29%. Out of that, 25% piglets died within first week after birth. There were no reports of mortality in piglets between 8-12 weeks of age and adult stages. The majority of pigs died due to respiratory distress associated with pyrexia. The profit/piglet was found to be Rs.611.76 which was remunerating for the rearing system in which farm labour and construction costs of sty were significantly low.

255. Khargharia, G.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division. Kumar, Suresh; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division. Kadirvel, G.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division. Doley, S.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division. Bharti, P.K.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division. Das, M.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.. Relationship of body weight with linear body measurements of Assam Hill Goat using path analysis.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.34-38 KEYWORDS: ASSAM. GOATS. BODY WEIGHT. STATISTICAL METHODS.

Relationship of 6 linear body measurements (body length, height at wither, rump height, heart girth, sacral pelvic width and rump length) on body weight of 68 adult (2-5 years) female Assam Hill goat was investigated using path analysis. The phenotypic correlations among body weight and linear body measurements were found to be positive. The correlation of body weight was found to be highest with body length (0.86) followed by heart girth (0.79). The strongest direct effect on body weight was found for heart girth (0.593) followed by body length (0.536). Indirect effects of other linear measurements were either through heart girth or body length. The optimum multiple regression equation for weight estimation included body length, heart girth, sacral pelvic width and rump length with coefficient of determination of 82.4 per cent. The results obtained in the present investigation could be helpful in weight estimation, selection and- breeding program of Assam Hill goat.

256. Ekambaram, B.; Sri Venkateswara Veterinary University, Tirupati (India). Livestock Research Station. Chakravarthi, Kalyana M.; Sri Venkateswara Veterinary University, Tirupati (India). Livestock Research Station. Rajesh, M.M.; Sri Venkateswara Veterinary University, Tirupati (India). Livestock Research Station. Biometrical measurements and performance of Punganur Cattle under farm conditions.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.56-58 KEYWORDS: CATTLE. BIOMETRY. MEASUREMENT. PERFORMANCE TESTING.

A small herd of Punganur animals (154) are being maintained at Livestock Research Station. Palamaner under Sri Venkateswara Veterinary

University as a part of in situ conservation. The data was collected on birth weight, biometrical measurements and certain physical traits. The average birth weights of male and female calves were  $10.80 \pm 0.48$  kg and  $10.80 \pm 0.79$  kg, respectively. The mean height at withers, body length, chest girth, paunch girth, pin bones width, poll length, tail length, and ear length in male calves in the present study were  $46.4 \pm 1.04$ ,  $43.80 \pm 1.12$ ,  $47.30 \pm 1.26$ ,  $45.70 \pm 1.40$ ,  $7.70 \pm 0.68$ ,  $18.40 \pm 0.93$ ,  $27.80 \pm 1.58$ ,  $8.60 \pm 0.68$  cm, respectively while in female calves the corresponding values were  $50.0 \pm 2.40$ ,  $43.5 \pm 1.26$ ,  $47.9 \pm 1.44$ ,  $47.9 \pm 1.22$ ,  $8.0 \pm 0.72$ ,  $19.8 \pm 1.00$ ,  $30.3 \pm 1.95$ ,  $9.2 \pm 0.52$  cm, respectively. The average total lactation milk yield was  $279.8 \pm 51.18$  litres with a lactation length of  $95.3 \pm 21.47$  days. The daily average milk yield and peak yields were  $2.4 \pm 0.33$  and  $2.6 \pm 0.34$  liters, respectively with an average 5.4 % fat and 9.53 % S.N.F. The average age at first calving, service period and gestation period were  $1540.2 \pm 242.86$  days,  $129.1 \pm 17.36$  days and  $276.9 \pm 0.79$  days, respectively.

257. Savino, N.; Nagaland University, Medziphema (India). School of Agricultural Sciences and Rural Development. Dept. of Livestock Production and Management. Chusi, Z.; Nagaland University, Medziphema (India). School of Agricultural Sciences and Rural Development. Dept. of Livestock Production and Management. Perumal, P.; Nagaland University, Medziphema (India). School of Agricultural Sciences and Rural Development. Dept. of Livestock Production and Management. Effect of sex on growth parameters of Naga local Pig. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.78-81 KEYWORDS: SWINE. GROWTH FACTORS. SEX. NAGALAND.

A study was conducted to assess the effect of sex on growth attributes such as body weight, body length, heart girth and height at wither growth in Naga local pig at birth, weaning and adult stage. These attributes were collected through measurement and field survey. The results revealed that there was significant difference between the male and female in different age groups except body weight at weaning and heart girth at weaning and at adult stage. Growth parameters were significantly higher in male than in female animal in three stages.

258. Doley, Sunil; ICAR Research Complex for NEH Region, Meghalaya (India). Division of Livestock Production. Chutiya, Hiranya; ICAR Research Complex for NEH Region, Meghalaya (India). Division of Livestock Production. Khargharia, Gautam; ICAR Research Complex for NEH Region, Meghalaya (India). Division of Livestock Production. Kumar, Suresh; ICAR Research Complex for NEH Region, Meghalaya (India). Division of Livestock Production. Das, Mukut; ICAR Research Complex for NEH Region, Meghalaya (India). Division of Livestock Production. Effect of seasons on the performance of different varieties of chicks in Meghalaya. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.98-102 KEYWORDS: CHICKS. VARIETIES. PERFORMANCE TESTING. SEASONS.

Series of experiments were conducted to study the performance of Vanaraja, Gramapriya and Indigenous chicks under deep litter system of rearing from 0-8th weeks of age in pre-monsoon, monsoon and post-monsoon seasons. The results revealed better performance of chicks in pre-monsoon compared to monsoon and post monsoon seasons in terms of body weight, growth rate and FCR although chick mortality was found to be significantly lower ( $p < 0.05$ ) in monsoon season. Irrespective of seasons, Vanaraja performed better followed by Gramapriya and Indigenous chicks in terms of body weight, growth rate and FCR.

in all the three seasons.

259. Samanta, A.K.; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Sharath, B.; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Jayapal, Natasha; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Kolte A.P.; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Senani, S.; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Sridhar, Manpal; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Parsad, C.S.; Natinal Institute of Animal Nutrition and Physiology, Bangalore (India). Comparison between probiotic and prebiotic on rumen metabolites and micr5obial population in Lambs.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.11-13  
KEYWORDS: PROBIOTICS. RUMEN. METABOLITES. MICROORGANISMS. LAMBS.

In the light of restriction on use of certain feed additives like antibiotics, growth promoters etc, probiotics and prebiotics are emerging as poten- tial alternative to improve rumen function. The present research was aimed to study the influence of pro biotic and prebiotic on rumen fermentation of lambs maintained on complete feed block. Twelve growing Bannur lambs were divided into three groups with four animals in each. As a result of supplementation of probiotic and prebiotic, TeA precipitable N was signifi- cantly (PO.05) improved with decrease in NPN fractions. Total viable bacteria population (no/ ml of rumen liquor) increased from  $10.67 \times 10^8$  to  $30.67 \times 10^8$  in probiotic-supplemented lambs and to  $18.83 \times 10^8$  in prebiotic supplemented lambs. Similarly, total protozoa population increased from  $2.88 \times 10^5$  to  $11.60 \times 10^5$  and  $13.92 \times 10^5$  in probiotic- and pre biotic-supplemented lambs, respectively. Prebiotic supplementation has also shown to modulate rumen fermentation in lambs in comparison to probiotics.

260. Jacob, Ninan; Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry (India). Instructional Livestock Farm Complex. Ganesan, R.; Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry (India). Instructional Livestock Farm Complex. Sreekumar, D.; Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry (India). Instructional Livestock Farm Complex. Nonlinear Growth model in Rabbits. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.23-26  
KEYWORDS: GROWTH RABBITS. BODY WEIGHT.

The body weight of twelve Soviet Chinchilla and thirteen White Giant rabbit kits recorded from birth to 132 days at regular intervals was used to fit nonlinear growth models viz. Gompertz, Logistic and Von Bertalanffy. Average weekly body weight was significantly lower in White Giant than in Soviet Chinchilla breed at all ages (except 48 days). Von Bertalanffy growth model described average weekly body weight growth remarkably well for both the rabbit breeds and can be effectively utilised in the farm.

261. Rajkumar, R.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Reproduction. Agarwal, S.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Reproduction. Singh, S.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Reproduction. Kumar, Anuj; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Reproduction.. Morphological and functional characterization of Buffalo endometrial epithelial cells cultured In vitro.. Indian Veterinary Journal (India).



(Sep 2015) v92(09) p.30-32 KEYWORDS: WATER BUFFALOES. ENDOMETRITIS. CELL CULTURE.

The present work was designed to establish buffalo endometrial epithelial cell culture and to observe their morphological and functional properties. Endometrial epithelial cells were isolated using 0.3% trypsin and cultured in vitro. The epithelial cells appeared in clumps and attached to matrigel coated surface as small colonies within 48 hrs and were spherical or polygonal in shape. Epithelial cells reached confluence by 7 to 8 days and exhibited cuboidal morphology. The basal PGF<sub>2a</sub> production by the endometrial cells was significantly higher (2.8 fold) than PGE<sub>2</sub>. Addition of oxytocin significantly increased PGF<sub>2a</sub> (5 fold) production as compared to basal level.

262. Gill, Kamalpreet Kaur; GADVASU, Ludhiana (India). College of Veterinary Science. Dept. of Veterinary Pharmacology & Toxicology. Sandhu, H.S.; GADVASU, Ludhiana (India). College of Veterinary Science. Dept. of Veterinary Pharmacology & Toxicology. Kaur, Rajdeep; GADVASU, Ludhiana (India). College of Veterinary Science. Dept. of Veterinary Pharmacology & Toxicology.. Evaluation of biochemical parameters in Buffalo calves exposed to subacute nitrate toxicosis.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.53-55 KEYWORDS: BIOCHEMICAL REACTIONS. WATER BUFFALOES. CALVES. POISONING.

Repeated oral administration of sodium nitrate 20.0 mg.kg.day<sup>-1</sup> for 21 consecutive days in buffalo calves produced significant elevation in plasma Aspartate aminotransferase (SGOT/AST), Alkaline phosphatase (ALP), Creatine kinase (CK), Gamma-glutamyl transpeptidase (GGTP), Lactate dehydrogenase (LDH), glucose and cholesterol levels. However, no significant change was observed in total protein, albumin, Blood urea nitrogen (BUN) and creatinine levels.

263. Sahoo, Saraswati; College of Veterinary Science and Animal Husbandry, Bhubaneswar (India). Dept. of Animal Reproduction Gynaecology and Obstetrics. Mohanty, Debendra Narayan; College of Veterinary Science and Animal Husbandry, Bhubaneswar (India). Dept. of Animal Reproduction Gynaecology and Obstetrics.. Effect of certain Immunomodulators on serum haptoglobin concentration in cyclic non-breeding cows.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.56-57 KEYWORDS: ENDOMETRITIS. BREEDING STOCK. COWS.

Twenty one repeat breeding cows were screened by white side test to eliminate endometritis and they were assigned to three treatment protocols with equal number of seven animals in each group. Cows in group I were administered with 50 ml of normal saline, in group II were received 20 ml of fresh colostrum and 10 ml of non pathogenic *E. coli* was given to the cows under group III as intra uterine medication. The estimation of serum Hp in all the experimental groups marked a decreasing trend, with the highest being observed at 0 day and the lowest at 21 days. Marked significant variation (p<0.01) was observed in all the experimental groups within the days of sampling, with the estimated values well within the range of normal animal.

264. Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Anuradha; Guru Angad Dev Veterinary and

Animal Sciences University, Ludhiana (India).. Identification of species on the basis of histomorphometrical study of compact bone.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.962-964 KEYWORDS: BONES. SCIENCE. SPECIES. IDENTIFICATION. TISSUE ANALYSIS.

The study was conducted on femur of human, cattle, buffalo, horse, dog, deer and poultry birds. The tissues were collected from mid shaft (diaphysis) of femur, decalcified, processed and paraffin section were cut. The cut sections were stained with hematoxylin and eosin, Masson's trichrome, periodic acid Schiff and alcian blue. The species can be identified on the basis of absence of plexiform bone in humans and its presence in animal bone and where plexiform bone is not present, the histomorphometry (Haversian system diameter and Haversian canal diameter) plays an important role in identification. Such type of study should be expanded more so that this data can be applied in forensic science.

265. Ebrahimi, Seyed Hadi; National Dairy Research Institute, Karnal (India). Datta, Madhu Mohini; National Dairy Research Institute, Karnal (India). Heidarian, Vahideh; National Dairy Research Institute, Karnal (India). Sirohi, Sunil Kumar; National Dairy Research Institute, Karnal (India). Tyagi, Amrish Kumar; National Dairy Research Institute, Karnal (India). Effects of fumaric or malic acid and 9,10 anthraquinone on digestibility, microbial protein synthesis, methane emission and performance of growing calves.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1000-1005 KEYWORDS: ANTHRAQUINONES. CATTLE. DIGESTIBILITY. METHANE. ORGANIC ACIDS.

This study was aimed to test whether combination of methanogens inhibitor and a hydrogen sink may result in any complementary effects in vivo. Growing calves (15; average 7- month-old, and weighing 130kg) were arranged into 3 groups in a randomized complete block design. Treatments were: Control (no additives), FA and AQ (control +6.5 mM of FA and AQ at the level of 4 ppm) and MA and AQ (control +6.5 mM of MA and 4 ppm of AQ). AQ in combination with FA or MA had no effect on final BW, AOG and daily feed intake. There was no effect of supplementation of additives on intestinal flow of microbial-N, apparent digestibility of OM, OM, CF, EE, NOF, and AOF but CP digestibility increased as a result of feeding AQ and organic acids. Nitrogen intake was similar in three groups but supplementation of diet with AQ and FA or MA decreased nitrogen losses through feces and urinary losses of nitrogen also slightly declined resulting in a nonsignificant improvement of nitrogen retention in treated groups than control. Feeding AQ and OAs resulted in a significant reduction of 9.5% methane per unit OM! in animals fed AQ and MA. It can be concluded that reduction of methane production caused by feed additives in the present study was not notable and could not improve animal performance and nutrients utilization which challenges previous in vitro findings observed in the use of organic acids and methane inhibitors in combination.

266. Bhadauria, Pragya; National Dairy Research Institute, Karnal (India). Lathwal, S.S.; National Dairy Research Institute, Karnal (India). Jadaun, Y.S.; National Dairy Research Institute, Karnal (India). Ruhil, A.P.; National Dairy Research Institute, Karnal (India). Devi, Indu; National Dairy Research Institute, Karnal (India). Gupta, Rohit; National Dairy Research Institute, Karnal (India). Effect of transition diet fortification on lameness and blood metabolites in pre-and post-partum lame Karan Fries cows.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9)

p.1006-1011 KEYWORDS: BLOOD PHYSIOLOGY. MOVEMENT DISORDERS. DIET. ZINC.

Peri-parturient period in high yielding cows always associated with a series of nutritional, biochemical, hormonal changes that leads to lameness in later lactation. Extra supplementation of vitamins and minerals responsible for hoof health is recommended in some dairy herds during this period. The present study was conducted by fortifying 10, 20 and 30 mg/d of biotin and 2 g/d of zinc sulphate during pre- and post-partum period (2 months before and 2 months after calving) of 40 high yielding lame crossbred KF cows, distributed into control and three treatment groups. The study revealed that, fortification of transition diet with biotin and Zn significantly reduced the lameness score and recovery time in supplemental groups compare to control group. In T-1, the lameness score was reduced by 1.3, T-2 reduction was maximum by 2, T-3 by 1.5, and in control 0.02 with their respective recovery period of hoof lesions were  $35.9 \pm 1.1$  (T-1)  $19.12 \pm 1.5$  (T-2),  $25.3 \pm 1.4$  (T-3) and  $56.2 \pm 2.7$  days. The overall glucose concentration was observed significantly higher in T-2 group as compared to control group, while overall NEFA and BHBA concentrations were significantly higher in control group as compared to other supplemental groups after 120 days of supplementation. Thus, it can be concluded from the study that, lameness in high yielding cows can be reduced by fortification of transition diet with biotin and zinc.

267. Sridhar, Manpal; National Institute of Animal Nutrition and Physiology, Bengaluru (India).Bhatia, R.; National Institute of Animal Nutrition and Physiology, Bengaluru (India).Dhali, A.; National Institute of Animal Nutrition and Physiology, Bengaluru (India).Saravanan, M.; National Institute of Animal Nutrition and Physiology, Bengaluru (India).Pradeep, Vidya; National Institute of Animal Nutrition and Physiology, Bengaluru (India).Thammaiah, Vandna; National Institute of Animal Nutrition and Physiology, Bengaluru (India).. Effect of exogenous lignolytic enzyme-treated ragi straw on DM intake, digestibility, rumen fermentation and rumen enzymes in sheep.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9)p.1012-1016 KEYWORDS: DIGESTIBILITY. ENZYME ACTIVITY. RUMEN. FUNGI.

The present study was conducted to evaluate the effect of exogenous lignolytic enzymes harvested from immobilized *Coriolus versicolor* and *Ganoderma lucidium* on body weight, in vivo digestibility, rumen fermentation and rumen enzymes in sheep. Four groups of sheep (6-each) were fed 350 g concentrate mixture to meet the energy and protein requirement as per ICAR standards. The control sheep received ad lib. ragi straw treated with production media devoid of enzyme (G 1). Test group 1 (G2) received ad lib. ragi straw treated with *C. versicolor* enzyme media (Enz.1) in a 1:2.5 (w/v) ratio, group 2 (G3) received ad lib. straw treated with *G lucidium* enzyme media (Enz.2) in a 1:2.5 (w/v) ratio. Group 3 (G4) received ad lib. amount of straw treated with a combination of Enz.1 and Enz.2 in an equal volume in a 1:2.5 (w/v) ratio. After 40 d feeding an ADG (gd<sup>-1</sup>) of 112.5 and 107.5 was recorded in G2 and G3 as compared to 97.5 of control. A 5% increase in dry matter digestibility (DMD) of  $77.36 \pm 4.28$  and  $77.04 \pm 5.69\%$  was obtained in G2 and G3. Treatment of straw with a combination of enzymes (G4) failed to show increase in either ADG or DMD. Rumen fermentation pattern did show any significant difference. The fiber degrading enzymes elicited enhancement of activity in sheep fed the supplemental enzymes. Applying lignin degrading enzymes as feed supplements

for enhancing digestibility of crop residues holds promise in the immediate future.

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

268. Mohanty, S.R.; College of Veterinary and Animal Husbandry, Bhubaneswar (India). Department of Livestock Production and Management.Sahoo, S.K.; College of Veterinary and Animal Husbandry, Bhubaneswar (India). Department of Livestock Production and Management.Babu, L.K.; College of Veterinary and Animal Husbandry, Bhubaneswar (India). Department of Livestock Production and Management.Panigrahi, B.; College of Veterinary and Animal Husbandry, Bhubaneswar (India). Department of Livestock Production and Management.Joshi, S.K.; College of Veterinary and Animal Husbandry, Bhubaneswar (India). Department of Livestock Production and Management.. Effect of feeding different levels of proteins on egg weight, egg quality, fertility, hatchability and fatty acid profile of eggs in Khaki Campbell Duck during laying period.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.25-30 KEYWORDS: FEEDING. PROTEINS. LAYING PERFORMANCE. DUCKS.

A feeding experiment was carried out to study the effect of feeding different levels of protein during laying on egg weight, egg quality, fertility, hatchability and fatty acid profile of eggs in khaki Campbell ducks. 180 ducks were distributed randomly into three treatment groups viz. T1 (16% CP), T2 (18% CP), and T3 (20% CP) with three replicates in each. There were 20 ducks (15 females and 5 males) in each replicate pen. It was found that the fertility of eggs ranged from 79.63 to 83.88% and hatchability of 67.81 to 73.45% in different treatments. Further, the fatty acid percentages in the duck egg, decreased in the order of MUFA > PUFA > SFA and the n6: n3 ratio of the eggs of duck of all the treatments recorded to be 1.59, 1.72 and 1.65 in T1, T2 and T3 respectively.

269. Gupta, J.J.; ICAR Research Complex for Eastern Region, Patna (India). Livestock and Fishery Management Division.Dey, A.; ICAR Research Complex for Eastern Region, Patna (India). Livestock and Fishery Management Division.. Nutritive value of promising cereal forages with or without combination of Leguminous forages in Goat.. Indian veterinary Journal (India). (Jul 2015) v92(7) p.34-37 KEYWORDS: GOATS. CEREALS. LEGUMES. FORAGE. NUTRITIVE VALUE.

Two feeding experiments were conducted to study the nutritive value of cereal forages (Sorghum and oat) with and without supplementation of legume forages (rice bean, soybean and berseem) in kharif and Rabi seasons in goats. Supplementation of legume forage soybean to sorghum significantly (P<0.05) increased dry matter intake, digestibility of dry matter (DM) and crude protein (CP), digestible crude protein (DCP) and digestible energy (DE) which resulted into significant increase in average daily gain (ADG) of body weight during experimental period. Similarly, supplementation of berseem to oat forage increased DMI, digestibility of DM and CP, DE, DCP and ADG values. However, supplementation of rice bean forage to sorghum showed higher CP digestibility and DCP values but non-significant difference in DMI and DM digestibility but significant increase in ADG. Thus, it is concluded that nutritive value of annual cereal forages can be improved through supplementation of legume forages for balanced feeding to goats.

270. Singh, S.P.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana

(India). College of Veterinary Sciences. Department of Veterinary Physiology. Singh, D.V.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Physiology.. Effect of Yea Sacc 1026 Supplementation on Rumen Metabolites and Microbial Activity in Buffalo Calves (Bubalus Bubalis). Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.37-40 KEYWORDS: RUMEN. METABOLITES. WHEAT STRAW. WATER BUFFALOES. CALVES.

Fifteen apparently healthy rumen fistulated buffalo calves were divided into group I kept on conventional diet consisting of green fodder and wheat straw, group II animals maintained on wheat straw alone and group III animals supplemented with Yea Sacc1026 along with wheat straw. Rumen liquor samples were collected before feeding (0 hr) and subsequently at 1, 2, 3, 4, 5 and 6 hr postprandial for 3 consecutive days after the period of microbial adaptation of 21 days. There was a significant decrease in ruminal pH, SAT and MBRT with supplementation of Yea Sacc1026 as compared to conventional diet and exclusive wheat straw feeding. The levels of TVF As, NH<sub>3</sub> - N and total nitrogen were significantly increased during supplementation of Yea Sacc1026. The body weight of the animals increased significantly with Yea Sacc1026 supplementation and conventional feeding, while exclusive feeding of wheat straw resulted in deterioration of body conditions and loss of body weight.

271. Tyagi, Amrish Kumar; National Dairy Research Institute, Karnal (India). Shandilya, Umesh K.; National Dairy Research Institute, Karnal (India). Srivastava, Anima; National Dairy Research Institute, Karnal (India). Kale, Vishnu R.; National Dairy Research Institute, Karnal (India). Kewalramani, Neelam J.; National Dairy Research Institute, Karnal (India).. Fatty acids profile of milk and milk products in cow and buffalo fed roughage based diet.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.889-896 KEYWORDS: FATTY ACIDS. FORAGE. MILK PRODUCTS. COWS. WATER BUFFALOES.

Diet composition is an important determinant of milk production and composition, including milk fatty acid profile. Present experiment evaluated the influence of diet on milk fatty acid composition of cow and buffaloes, which have varying genetic potential of milk secretion and mammary lipogenesis. Sixteen of each multiparous crossbred cows and Murrah buffaloes were divided in 2 equal groups of each species with 8 animals in each group making 4 groups altogether (groups 1 and 2 for cows and groups 3 and 4 for buffaloes). Cows and buffaloes of groups 1 and 3 were fed ad lib. berseem (*Trifolium alexandrinum*) fodder along with wheat straw, whereas, animals of groups 2 and 4 were offered concentrate mixture and wheat straw. Fatty acid profiles were determined of milk samples and ghee (clarified butter oil) prepared at fortnight intervals by indigenous and creamery (commercial) methods from the total milk collected from each group. Total milk fat, protein, total solids and solid not fat contents of milk were similar between cow and buffaloes irrespective of dietary changes. Total CLA content in milk was higher in berseem fed groups of both the species. In conclusion, total PUFA and SFA levels of cow and buffalo milk with same feeding regimen were nonsignificant. However, the total MUFA content significantly increased in cows when fed with green fodder as compared to buffaloes. Furthermore, total CLA content in ghee prepared using indigenous method was higher as compared to that of creamery method.

272. Kumar, Ravindra; ICAR, Makhdoom (India). Central Institute for Research on

Goats.Tripathi, P.; ICAR, Makhdoom (India). Central Institute for Research on Goats.Chaudhary, U.B.; ICAR, Makhdoom (India). Central Institute for Research on Goats.Tripathi, M.K.; ICAR, Makhdoom (India). Central Institute for Research on Goats.Singh, R.K.; ICAR, Makhdoom (India). Central Institute for Research on Goats.. Effect of azolla based complete pellet feed on growth, nutrient utilization, blood metabolites and rumen fermentation in Barbari goats.. Indian Journal of Animal Sciences (India). (Aug 2015)v.85(8) p.897-901 KEYWORDS: AZOLLA. BLOOD PROTEINS. NUTRIENTS. RUMEN. METABOLITES.

Present study was conducted to examine the effect of replacing concentrate mixture with sun-dried azolla on growth, nutrient utilization, blood and rumen metabolites in growing Barbari goats in completely randomized design. Male Barbari goats (12) were divided into 2 groups, control and experimental, consisting of 6 animals in each group. The control group was fed with complete pellet feed having Bengal gram straw and concentrate mixture in 60:40 ratio, experimental group was fed with complete pellet feed in which 25% of concentrate mixture was replaced with sun-dried azolla. The duration of experimental feeding was 8 weeks. Weekly body weights were recorded to assess growth rate of goats. After 6 weeks of experimental feeding a metabolism trial of 6 days duration was conducted to determine nutrients digestibility and nitrogen balance. Blood and rumen liquor samples were collected at the end of experimental feeding. The average daily gain (g) of control group(56.60) and experimental group (78.12) was statistically similar. The goat of control and experimental group had statistically similar daily dry matter intake. The digestibility (%) of dry matter, organic matter, ether extract and total carbohydrate was statistically similar to control and experimental group of goat (52.41, 55.46,69.72 and 57.46 respectively). Crude protein digestibility was significantly higher in treatment group (77.43) as compared to control (71.14) group of goats. The digestibility (%) of different fibre fractions (neutral detergent fibre, acid detergent fibre), cellulose and hemicellulose were similar in treatment group. Animals of both the groups were in positive balance of nitrogen. There was no statistically significant effect replacement of concentrate mixture with sun-dried azolla on hematology and blood biochemical metabolites (hemoglobin, total protein, albumin, globulin, triglycerides and total cholesterol) of goats. The pH of rumen fluid was 6.30 for control group and 6.25 for experimental group of goats. Total volatile fatty acids (mmoVIOOml) were statistically similar in control (15.46) and treatment (16.70) groups of goats. There was no significant difference in nitrogenous fractions (mg/dl), total nitrogen, TCA-ppt nitrogen and non protein nitrogen of rumen fluid collected at the end of experimental feeding of control and treatment group of goats. From present study it can be concluded that sun-dried azolla can replace 25% of concentrate mixture in the complete pellet feed of growing Barbari goats without any adverse effect on growth, nutrient utilization, blood and rumen fermentation parameters.

273. Chandrahas; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).Saijpaul, S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).Sandhu, K.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).Saini, A.L.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).. Stress appraisal by organic-inorganic zinc and copper supplementation in Beetal kids.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.908-912 KEYWORDS: COPPER. ZINC. SUPPLEMENTS. TOLERANCE. COLEOPTERA.

To assess the stress tolerance, challenge stressor was induced in 14 Beetal kids of 3 months after random distribution in 2 groups (T MM and TOM)' All kids received ad lib. Concentrate feed supplemented with 2% mineral mixture of similar composition except TMM with inorganic Zn and Cu as sulphate salts and TOM with organic amino acid-mineral complex as Zn-lysine and Cu-lysine. The kids of both groups were challenged with 0.2 ml adjuvant complete freund (ACF) intra-dermally after 90 days of feeding. Hb and PCV declined in TMM group. TLC declined in TOM group. Serum creatinine was higher in TMM group. Serum BUN and albumin elevated after challenge in TOM group. Serum glucose declined after challenge in T MM' At the end of study GPX level was higher in TOM group. It was concluded that organic Zn and Cu had better potential for stress tolerance in goat kids.

274. Singh, Vivek Pratap; Banaras Hindu University, Varanasi (India).Institute of Agricultural Sciences. Dept. of Animal Husbandry and Dairying.Dubey, Mayank; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences. Dept. of Animal Husbandry and Dairying.Pandey, Rajendra Kumar; Banaras Hindu University, Varanasi (India). Institute of Agricultural Sciences. Dept. of Animal Husbandry and Dairying.. Effect of different feed combinations on nutrient intake and digestibility in cross-bred Heifer.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.10-15 KEYWORDS: NUTRIENT INTAKE. DIGESTIBILITY. FEED INTAKE. HEIFERS.

An experiment was conducted for a period of 360 days to study the nutrient intake, digestibility of feed as well as economics of replacement heifers fed different feed combinations of ration. Twenty four (Holstein Friesian )( Sahiwal) and (Jersey )( Sahiwal) cross-bred heifer calves of 4 to 6 month of age of 55.27 to 62 kg body weight were divided into four equal groups viz T1 (control), T2'T3 and T4• The four groups of cross-breed heifers namely fed as T1=Control (Farm ration), T2= 50% Barley + 30% MC +10% AC + 8% WB + 2%MM, T3= 50% Maize + 30% MC +10% AC + 8% WB + 2% MM and T4= 50% Sorghum + 30% MC +10% AC + 8% WB + 2% MM, different feed combinations were made in order to judge the effect of different feeds on nutrients intake and its digestibility at different months. Significantly higher (p0.05) nutrient intake (OM, CP, TON and ME) was observed in the group T3. The digestibility of nutrients (OM, OM, CP,EE, CF and NFE) were also significantly higher (p0.05) in T3 group.The total cost per heifer was highest in T4 followed by T3' T2 and lowest in T1 groups respectively.

275. Kumar, Prasanna R.; College of Veterinary Science, Rajendranagar (India). Dept. of Animal Nutrition.Sivaiah, K.; College of Veterinary Science, Rajendranagar (India). Dept. of Animal Nutrition.Rao, Raghava E.; College of Veterinary Science, Rajendranagar (India).Dept. of Animal Nutrition.. In Vitro evaluation of sugarcane by-product based complete rations.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.24-30 KEYWORDS: IN VITRO. SUGARCANE. EVALUATION.

Forty two different complete rations were formulated by using the sugarcane by- products and other crop residues and evaluated through in vitro studies to select best combinations for preparation of complete rations for growth and milk production in buffaloes.Three graded Murrah buffalo bulls fitted with permanent rumen cannulae were used for in vitro evaluation of experimental rations. The average body weight of the buffalo bulls was 250 ± 1.0 kg. The fistulated buffalo bulls were maintained on a feeding regimen were

offered 2 kg of non- leguminous green fodder (Hybrid Napier) and concentrate mixture daily at 8.00 am and 1.00 pm, while sugarcane bagasse was offered throughout the day these complete rations were evaluated for In vitro Dry Matter Digestibility (IVDMD) %. These complete rations containing 20 per cent sugarcane trash, sorghum straw, paddy straw, urea treated sugarcane trash, pillipesara hay or sunhemp hay along with 40 per cent each of sugarcane tops and concentrate component. The average IVDMD (%) of sugarcane by-product based complete ration was  $54.14 \pm 4.73$  (Table 7.).

276. Kumar, Suresh; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Barman, Geetima; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Khargharia, Gautam; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Barman, Champak; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Kadirvel, G.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Doley,Sunil; ICAR Research Complex for NEH Region, Meghalaya (India).Livestock Production Division.Bharti, P.K.; ICAR Research Complex for NEH Region, Meghalaya (India). Livestock Production Division.Amelioration of weaning stress in crossbred piglets using prebiotic and probiotic supplement.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.31-33 KEYWORDS: PROBIOTICS. SACCHAROMYCES CEREVISIAE. PIGLETS.

The present study was designed to assess the effect of probiotic and prebiotic on growth performance and variation on haematological profile of crossbred weaned pigs. A total of 20 weaned crossbred piglets of 87.5 percent Khasi local x Hampshire and Ghungroo of ten each were selected on the basis of weight and divided equally as into two groups irrespective of their sex. The feed additive had been added at the level of 2% in treatment group along with feed for three months during winter season. Individual body weight was measured at fifteen days interval and blood samples were collected at monthly intervals for haematological parameters. The final body weight at the end of the experiment was found to be  $27.67 \pm 5.36$  kg in control group and  $29.40 \pm 2.22$  kg in the treatment group. There was no significant difference in body weight between the treatment and the control groups at any stage of the experiment. There was significant(P0.05) difference between control and treatment group in respect of WBC and neutrophil count, although there was no Significant difference in other haematological parameter.

277. Chandra, Sarat A.; PV Narsimha Rao Telangana State University for Veterinary Animal and Fishery Sciences, Rajendranagar (India). College of Veterinary Science. Dept. of Livestock Production Management.Mahender, M.; PV Narsimha Rao Telangana State University for Veterinary Animal and Fishery Sciences, Rajendranagar (India).College of Veterinary Science. Dept. of Livestock Production Management.Harikrishna, CH.; PV Narsimha Rao Telangana StateUniversity for Veterinary Animal and Fishery Sciences, Rajendranagar (India). College of Veterinary Science. Dept. of Livestock Production Management.. Dietary supplementation of probiotics and enzymes on slaughter traits and meat composition in broiler Rabbits.Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.73-78 KEYWORDS: PROBIOTICS. ENZYMES. MEAT. RABBITS.

An experiment was conducted to study the influence of housing



system and dietary supplementation of probiotics and enzymes on slaughter traits and meat composition in broiler rabbits. A total of 144 weaned rabbits were divided into 2 groups of 72 each and housed under conventional cage system and backyard system. The rabbits in each housing system were divided into 4 groups of 18 each and diets were supplemented with probiotics, enzymes and both. Six rabbits from each group were slaughtered at 16 weeks of age for the study. Significantly higher pre-slaughter weight, dressed weight, fore and mid cut weights and inedible offal's were recorded by rabbits housed in cages. Among rabbits housed in cages, only weight of hind cut and length of caecum were significantly higher in rabbits fed rations supplemented with either probiotics or enzymes or both. In backyard system, pre- slaughter weight, dressed weight, dressing percentage, fore cut weight, mid cut weight, head and feet weight, offal weights and length of caecum were significantly different among rabbits fed with diets supplemented with probiotics and or enzymes. Meat protein and fat percentage were significantly high in rabbits housed in cages. The protein content was significantly high in the rabbits fed rations supplemented with probiotics and both probiotics and enzymes, while the fat content was significantly high in the rabbits fed with control ration in cage reared rabbits. In backyard system, rabbits fed control ration recorded significantly lower protein and higher fat content compared to the rations supplemented with either probiotics and or enzymes .

278. Kahate, P.A.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Dept. of Animal Husbandry and Dairy Science.Chavan, S.D.;Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Dept. of Animal Husbandry and Dairy Science.Waghmare, S.P.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Dept. of Animal Husbandry and Dairy Science.Shelke, R.R.; Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (India). Dept. of Animal Husbandry and Dairy Science.. Haemo-biochemical studies in indigenous calves on feeding ammoniated soybean straw.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.84-89 KEYWORDS: SOYBEANS. STRAW. BLOOD. BIOCHEMISTRY. CATTLE.

The present study was carried out in the Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, comprising duration of 90 days. Soybean straw was treated with urea at 1.0, 1.5 and 2.0 per cent level and covered with tarpoline, kept under shed for 28 days for incubation under anaerobic condition to allow for chemical reaction. The selected 20 calves were divided in four groups on the basis of nearness in BW and age, thereby each group comprised of five calves. Further, one calf from each group was allocated randomly to each treatment, namely untreated SBS (T1), 1.0% urea treated SBS (T2) , 1.5 % urea treated SBS (T3) and 2.0 % urea treated SBS (T4). As a result, each treatment was replicated on five calves. It was found that, rate of increasing serum total lipids it appears that feeding of urea treated SBS was advantageous than that of untreated SBS. Thus in general, it appears that feeding of urea ammoniated SBS to calves had no adverse effect on haemo-biochemical blood profile.

279. Saikia, Nitul; Assam Agricultural University, Khanpara (India).College of Veterinary Science. Dept. of Animal Nutrition.Saikia, B.N.; Assam Agricultural University, Khanpara (India). College of Veterinary Science. Dept. of Animal Nutrition. Effect of feeding total mixed ration (TMR) on milk constituents in lactating cow.Indian

Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.97-98 KEYWORDS: COMPOUND FEEDS. RATIONS. MILK. COWS. LACTATION.

Eighteen crossbred lactating cows were randomly selected for the experiment on the basis of live weight and milk yield. The animals were divided into three groups and allotted to three dietary treatments, viz.- To' T1 and T2. Animals in To groups were fed by conventional method (concentrate and roughages fed separately) and feeding of animals in T1 and T2 were done in the form of total mixed ration, where the roughage: concentrate ratio was maintained at 40:60 and 50:50, respectively. The feeding trial was conducted for 120days. Milk and blood samples were analyzed at fortnightly and monthly interval respectively. The percent total solids, protein, fat, SNF and lactose content in milk was comparable among the treatments. Thus, feeding system does not have any significant impact on the constituents of milk and blood.

280. Sadrsaniya, D.A.; Sardarkrushinagar Dantiwada Agricultural University, SK Nagar (India).Raval, A.P.; Sardarkrushinagar Dantiwada Agricultural University, SK Nagar (India).Bhagwat, S.R.;Sardarkrushinagar Dantiwada Agricultural University, SK Nagar (India).Nageshwar, A.; Sardarkrushinagar Dantiwada Agricultural University, SK Nagar (India).. Effects of probiotics supplementation on growth and nutrient utilization in female Mehsana Buffalo Calves.Indian Veterinary Journal (India). (Sep 2015) v92(09) p.20-22 KEYWORDS: WATER BUFFALOES. PROBIOTICS. SUPPLEMENTS. GROWTH. NUTRIENTS. CALVES.

A growth trial of 90 days was conducted on fourteen growing Mehsana female buffalo calves to observe the effects of probiotics supplementation on growth, nutrient utilization and economics. The experimental animals were divided into two groups i) T 1 (Control) and ii) T2 (T 1+ Probiotics g/d/animal). Probiotics supplementation significantly increased average daily weight gain (AD G) , DM, CP, DCP and TDN intake, digestibility coefficient of DM, CP and NFE. Probiotics have also positive effect on feed conversion efficiency (FCE) and cost of feed /kg wt. gain (p<0.05). Thus, probiotics is also beneficial and cost effective in term of cost of feed / kg wt.gain of experimental female calves.

281. Jini, K.S.; College of Veterinary and Animal Sciences, Mannuthy (India). Dept. of Animal Nutrition.Syam Mohan, K.M.; College of Veterinary and Animal Sciences, Mannuthy (India). Dept. of Animal Nutrition.Ally, K.; College of Veterinary and Animal Sciences, Mannuthy (India). Dept. of Animal Nutrition.Dipu, M.T.; College of Veterinary and Animal Sciences, Mannuthy (India). Dept. of Animal Nutrition. Effect of phase feeding on growth performance in Pre-Ruminant crossbred calves.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.41-43 KEYWORDS: CROSSBREDS. COWS. CALVES. FEEDING. PROTEIN QUALITY. GROWTH.

An experiment was conducted with fifteen cross- bred calves below one week of age for a period of 20 weeks in two phases viz.phase I and phase II. The calves were divided into three groups I, II and III of five each and calves of group I were offered calf starter containing 24 per cent crude protein (CP) throughout the period of study, group II with 18 and 21 per cent CP and group III with 15 and 18 per cent CP during phase I and II, respectively. No difference (P<0.05) could be noticed in any of the parameters employed for evaluation among the three groups. It could be inferred that phase feeding can be practised in pre-ruminant crossbred calves from six to 20 weeks of age without any adverse effect on their growth performance.

282. Kanagaraju, P.; Tamilnadu Veterinary and Animal Sciences University, Chennai (India). Poultry Research Station. Omprakash, A.V.; Tamilnadu Veterinary and Animal Sciences University, Chennai (India). Poultry Research Station.. Effect of Xylo Oligosaccharides (XOS) from ricebran on growth performance of Japanese Quails.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.47-49 KEYWORDS: RICE. BRAN. FEEDING. GROWTH. PERFORMANCE TESTING. QUAILS.

Prebiotics are alternative to antibiotic growth promoters in poultry diet. A 35 days feeding trial was conducted to evaluate the effect of xylo oligosaccharide (XOS) on the performance of quails. 240 quails were randomized into 4 treatments with 3 replicates of 20 chicks each. Quails were fed with basal diet (T1), supplemented with XOS at the rate of 0.1 % (T2), 0.15% (T3) and 0.20% (T4). Dietary supplementation of XOS at 0.15 or 0.20% level in Japanese quails improved growth performance, FeR and livability. Supplementation of XOS significantly lowered mean total cholesterol whereas serum triglycerides were not affected by the XOS supplementation. XOS significantly (P<0.05) reduced *E.coli* in duodenal content. However serum glycerides were not altered. XOS could be a cheap and potential substitute to antibiotic growth promoter in Japanese quail diet at 0.15 - 0.2 % level.

283. Pamei, Guikinglung; University Research Farm, Chennai (India). Gnanaraj, Tensigh P.; University Research Farm, Chennai (India). Sivakumar, T.; University Research Farm, Chennai (India). Jawahar, Thilak Pon K.; University Research Farm, Chennai (India). Muthuramalingam; University Research Farm, Chennai (India). Effect of chromium supplementation on the growth performance of Crossbred Pigs.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.50-53 KEYWORDS: CROSSBREDS. SWINE. CHROMIUM. GROWTH. PERFORMANCE TESTING.

A study was conducted to assess the effect of chromium on growth performance of crossbred (Large White Yorkshire X Landrace) pigs under swill feeding, at an organized pig farm Tambaram, for a period of 5 months. Twenty four, early weaned piglets were selected for the purpose of the study and were randomly divided into three groups of eight each. All the treatment groups were subjected to intensive system of management and standard health coverage protocols were followed as per the farm guidelines. Group I and Group II were supplemented with chromium in the form of chromium tripicolinate at the rate of 0.1 and 0.2 mg per kg of swill feed respectively and Group III was kept as control. There was no significant difference with respect to fortnightly body weight, fortnightly body weight gain and feed efficiency.

284. Naik, Surendra Kumar; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Tiwari, S.P.; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Sahu, Tarini; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India). Doneria, Raina; Chhattisgarh Kamdhenu Vishwavidyalaya, Durg (India).. Effect of dietary supplementation of organic selenium and vitamin E on growth performance, carcass characteristics and meat quality of broiler chickens.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1021-1024 KEYWORDS: BROILER CHICKENS. CARCASS COMPOSITION. GROWTH. PERFORMANCE TESTING. MEAT INSPECTION.

Present study was conducted in a 3 x 2 factorial arrangement of 3 levels of organic selenium (0, 0.1, and 0.2 ppm) and 2 levels of vitamin E (0 and

300 mg/kg) to determine the effect of organic selenium and vitamin E on growth performance, carcass characteristics and meat quality in broiler chickens. Day-old Vencobb broiler chicks (180) were randomly divided into 6 treatments (3 replicates of 10 birds/treatment). The diets were formulated according to BIS (1992). The diet was based on corn soybean meal. Study revealed significant interaction in between organic selenium and vitamin E for feed intake, body weight, FCR, dressing percentage and protein and lipid content of muscle. The broilers receiving 0.1 ppm organic selenium with 300 mg/kg vitamin E (T 4) displayed heavier final weight and improved FCR. The highest dressing percentage was determined in the similar group (T4). As the level of vitamin E increased in the broilers diet, protein percentage of breast and thigh muscle significantly increased whereas, lipid percentage significantly decreased. Lowest muscle lipid and highest protein percentage obtained in broilers receiving 0.1 ppm organic selenium with 300mg/kg vitamin E (T4). It can be concluded that dietary organic selenium with vitamin E in broiler feed improved the growth performance and gave the possibility for achievement of better quality meat and higher meat yield.

285. Soni, N.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).Mishra, S.K.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).Swain, R.K.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).Das, A.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).Behura, N.C.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).Sethi, K.; Orrisa University of Agriculture and Technology, Bhubaneswar (India).. Effect of supplementation of organic zinc on the zinc level and quality traits of eggs in broiler breeders.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1025-1030 KEYWORDS: BROILER CHICKENS. EGGS. QUALITY. ZINC.

Broiler breeder hens (264) of 32 weeks of age were distributed randomly in 4 dietary treatments. The dietary treatments were To:Broiler breeder ration containing 40ppm zinc (basal 29.8 ppm + 10.2ppm inorganic zinc), T1: To + organic zinc (zinc methionine) 20ppm,T2: To + organic zinc 40ppm and T3: To + organic zinc 60ppm. The experiment was continued from 32 to 48 weeks of age. At 35, 39,43 and 48 week, the egg quality traits and zinc level in the eggs were assessed. Expect the egg shell thickness, the other studied egg quality parameters viz. egg weight (g), egg length (mm), egg breadth(mm), egg shell thickness without membrane (mm), yolk height (mm),yolk diameter (mm), albumen height (mm), albumen weight (g), yolk weight (g), egg shell weight (g), shape index and Haugh unit of female broiler breeder of different treatments during the experimental period did not differ significantly in all the periods.The zinc content of egg shell of all the groups of broiler breeder birds did not differ significantly at 32 and 39 week of age but at 40 and 48 weeks of study, significantly higher egg shell zinc content was observed in T 3 group and lowest in To. The zinc content in the egg albumen of all the groups of broiler breeder birds did not differ significantly in all the periods of study. Except at 35 weeks, the zinc content of egg yolk and total egg differed significantly with lowest levels was observed in To. The egg shell thickness and egg shell weight of 40ppm and 60ppm zinc supplemented group were significantly higher than all other groups. Other egg quality traits found to be unaffected among treatment groups.

286. Dowarah, Runjun; Guru Angad Dev Veterinary and Animal Sciences University,

Ludhiana (India). Department of Animal Nutrition.Sethi, A.P.S.; Guru Angad Dev Veterinary and Animal Sciences University,Ludhiana (India). Department of Animal Nutrition.Brah, G.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana(India). Department of Animal Nutrition. Effect of dietary energy and protein on growth performance and carcass characteristics of White Plumage Japanese Quails during summer season.. Animal Nutrition and Feed Technology (India). (Sep 2014) v14(3) p.461-470 KEYWORDS: CARCASSES. ENERGY. PROTEINS. SUMMER. QUAILS.

An experiment, with different levels of dietary energy and protein, was conducted to assess the growth performance, nutrient utilization and carcass characteristics of meat type white plumage Japanese quail up to 5 weeks of age during summer season. Nine dietary treatments with three levels of crude protein (23, 25 and 27%CP) each at three levels of energy (2600, 2800 and 3000 kcal ME/kg) during starter (13 weeks) phase and 18, 20 and 22% CP each at three levels of energy (2800, 2900 and 3000 kcal ME/kg) during finisher (4-5 weeks) phase were offered respectively in 3 x 3 factorial design. A metabolism trial was conducted at 5th week, selecting 4birds from each replicate using total collection method. Final BW,gain in weight, feed intake and FCR did not differ due to dietary energy levels, while final BW and gain in weight increased linearly ( $P \leq 0.05$ ) with each increment of protein in the diets. N-retention, digestibility of ether extract, crude fibre, calcium and availablephosphorus also showed significant ( $P \leq 0.05$ ) variations due to different levels of energy and protein. Neither eviscerated weight nor dressing percentage was affected by dietary energy or protein levels; however, there was linear increase in abdominal fat content with increase in dietary energy at each level of protein. The percent gible weight was lowest at highest level of energy and protein. The interaction of energy x protein during starter and finisher phase had significant ( $P \leq 0.05$ ) effect on growth parameters and nutrient utilization. It may be concluded that 27% CP with 2600 kcal ME/kg during starter phase and 22% CP with 2900 kcal ME/kg in finisher phase is optimum for white plumage Japanese quail during summer season.

287. Singh, Jaswinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Sethi, A.P.S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Sikka, S.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Chatli, M.K.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).Department of Animal Nutrition.Kumar, Pawan; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.. Effect of Cinnamon (*Cinnamomum cassia*) powder as a phytobiotic growth promoter in commercial broiler chickens.. Animal Nutrition and Feed Technology (India). (Sep 2014) v14(3) p.471- 479 KEYWORDS: BROILER CHICKENS. ANTIBIOTICS. CINNAMON. GROWTH. PERFORMANCE TESTING. MEAT. QUALITY.

A study was conducted to evaluate cinnamon (*Cinnamomum cassia*) powder as a phytobiotic alternative to antibiotic growth promoters in broilers. A total of 210 one-day old broiler chicks (IBL 80) were randomly distributed to five treatments each with three replicates of 14 birds. The dietary treatments comprised of feeding a basal diet as a control (CON), or the basal diet supplemented with either 0.1g oxytetracycline per kg diet as negative control

(OXT), or cinnamon powder at low (0.5%; CPL), medium (1.0%; CPM) and high (1.5%; CPH) levels. Body weight and feed consumed were recorded weekly and accordingly feed conversion ratio and protein efficiency ratio were calculated. At the end of 5th week, two birds per replicate were sacrificed to determine the carcass characteristics and sensory evaluation of meat. Supplementation of cinnamon at all the three levels improved (P0.05) the BW gain in the broilers during starter and overall period, which was statistically comparable to CON and OXT groups. The best FCR was observed in CPH group followed by CPM and CPL groups during the finisher and overall period which was better (P0.05) than the CON and OXT groups. Dietary treatments did not influence the carcass characteristics significantly. Supplementation of cinnamon powder at all the levels studied improved (P0.05) the sensory attributes of the meat as compared to CON group meat. Highest (P0.05) benefit: cost ratio was found in OXT and CPL groups, and it was lowest in CPM and CPH groups. From the result of present study it could be suggested that dietary inclusion of 0.5% cinnamon powder can be used as phytobiotic alternative to antibiotic growth promoters in broilers.

288. Choubey, M.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Pattanaik, A.K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Baliyan, S.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Kumar, Ajit; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Kumar, Avneesh; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Dutta, Narayan; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Jadhav, S.E.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Sharma, K.; Indian Veterinary Research Institute, Izatnagar (India). Division of Animal Nutrition. Effect of a composite phytochemical feed additive on in vitro substrate degradation and methanogenesis and in vivo rumen fermentation.. *Animal Nutrition and Feed Technology (India)*. (Sep2014) v14(3) p.523- 534 KEYWORDS: IN VITRO. METHANE. INHIBITION. RUMEN DIGESTION.

The present study was carried out to evaluate the potential of a composite phytogenic feed additive (cPFA) on rumen fermentation characteristics under in vitro as well as in vivo conditions. The cPFA was formulated using different parts of 11 herbal plants, well acclaimed for their therapeutic virtues. Graded levels (0, 1.0, 1.5, 2.0, 2.5, 5.0, 7.5 and 10%) of cPFA were supplemented to the basal substrate and incubated with rumen liquor of sheep for in vitro gas production test and methanogenesis. For in vivo study 28 Malpura hogget lambs (7–8 months;  $17.8 \pm 2.04$  kg) were divided in four equal groups and fed diets supplemented with cPFA at 0 (Control), 1.0 (L-cPFA), 1.5 (M-cPFA) and 2.0 (H-cPFA) percent of feed intake. At the end of experimental feeding of 180d, rumen liquor was collected at 4h post feeding. Results indicated that, in vitro supplementation of cPFA reduced (P0.05) total gas production and improved (P0.05) the microbial biomass production. There was a linear increase (P0.05) in ammonia concentration accompanied by a reduction (P0.05) in acetate concentration. There emerged a linear decrease (P0.05) in methane production up to a level of 5% cPFA supplementation. In vivo study revealed that there was no effect of cPFA supplementation on pH, ammonia and different nitrogen fractions in strained rumen liquor (SRL) among the groups; however, a trend of improvement in the total N was evident in cPFA supplemented groups when contrasted against control. The level of 1.5 and 2.0% cPFA supplementation

showed higher

289. Singh, Sultan; Indian Grassland and Fodder Research Institute, Jhansi (India). Plant Animal Relationship Division. Shukla, G.P.; Indian Grassland and Fodder Research Institute, Jhansi (India). Crop Improvement Division. Joshi, D.C.; Indian Grassland and Fodder Research Institute, Jhansi (India). Crop Improvement Division. Evaluation of dual-purpose Sorghum Hybrids for nutritional quality, energetic efficiency and methane emission. *Animal Nutrition and Feed Technology (India)*. (Sep 2014) v14(3) p.535- 548 KEYWORDS: CARBOHYDRATE CONTENT. DEGRADATION. ENERGY. METHANE. SORGHUM. HYBRIDS.

Present study evaluated 25 dual-purpose sorghum hybrids for their nutrient contents, in sacco DM digestibility, nutritive value and methane emission potential. The CP, OM, EE, NDF, ADF, cellulose and lignin contents of the hybrids differed significantly (P0.05) and mean values were 99.0, 924, 15.0, 604, 334, 264 and 42.5 g kg<sup>-1</sup> DM, respectively. Carbohydrate content and its fraction varied across the hybrids significantly (P0.05). The hybrids differed (P0.05) in terms of DM intake (DMI), leaf to stem ratio and digestible DM (DDM) with the values ranging between 1.78 to 2.32%, 11:89 to 26:74 and 59.4 to 67.2%, respectively. In sacco degradability of DM, OM, CP, NDF, ADF and cellulose varied (P0.05) amongst the hybrids. Relative feed value (RFV) and TDN varied (P0.05) from 81.9 and 55.7 for the hybrid 716A x NTI-2 to 120 and 67.9% for 685A x ICSR89 hybrid. The hybrids differed (P0.05) in their DE and ME contents with the mean values being 12.2 and 10.0 kJ g<sup>-1</sup> DM, respectively. Net energy efficiency for maintenance (NEm), lactation (NEl) and growth (NEg) of tested hybrids differed and ranged between 5.52 to 7.11, 5.19 to 6.53 and 2.51 to 4.10 kJ g<sup>-1</sup> DM, respectively. The methane production varied (P0.05) significantly and ranged from 45.8 to 82.1g kg<sup>-1</sup> DDM. Male sterile lines viz. 686A, 685A and 716A resulted in higher values for CP, nutrient degradability, DMI and RFV in their respective hybrids. Results indicated that hybrids 686A x IS697, 685A x ICSR 89 and 685A x GP 65072 are nutritionally superior with low to moderate methane production potential.

290. Beigh, Y.A.; Faculty of Veterinary Sciences and Animal Husbandry, Srinagar (India). Division of Animal Nutrition. Ganai, A.M.; Faculty of Veterinary Sciences and Animal Husbandry, Srinagar (India). Division of Animal Nutrition.. Effect of feeding graded levels of leaf meal on digestibility, clinical chemistry and rumen fermentation of Lambs.. *Animal Nutrition and Feed Technology (India)*. (Sep 2014) v14(3) p. 549- 562 KEYWORDS: BLOOD. BIOCHEMISTRY. ECONOMICS. LAMBS. LEAF MEAL. RUMEN DIGESTION.

In order to study the effect of replacing conventional concentrates with graded levels of leaf meal (LM) mixture in total mixed rations (TMR), 20 Corriedale lambs were divided randomly into four equal groups. The animals of control group (T1) were maintained on the TMR comprising of oats straw and concentrate mixture while in T2, T3 and T4 groups, the concentrate mixture in TMR was replaced with LM 15, 30 and 45%, respectively. Blood analysis was carried out at the start and end of the 120d experiment. Rumen studies was carried out at the end of the trial period. DM intake was significantly (P0.05) improved in groups fed LM at 30 and 45% of concentrate mixture. The lambs fed rations with concentrate mixture replaced at 0 (T1) and 30% (T3) level by LM had significantly (P0.05) higher gain in weight. Mean values of Hb and PCV, total protein, albumin, globulin, urea, creatinine and cholesterol, Ca and P and SGOT,

SGPT and ALP were similar among the groups except for significant variation seen in serum urea. The ruminal pH, TVFA, NH<sub>3</sub>-N and NPN varied significantly among the groups. Cost of production lowered significantly (P<0.01) due to inclusion of LM mixture with highest percent reduction in feed cost per kg LW gain (19.27) at 30% and lowest (2.77) at 15% replacement. It is concluded that replacement of concentrate mixture in TMR by LM had no adverse effects on health, growth and rumen fermentation pattern in lambs and better results could be obtained at 30% replacement level.

291. Venkateswarlu, M.; Sri Venkateswara Veterinary University, Hyderabad (India). College of Veterinary Science. Department of Animal Nutrition.Reddy, Ramana Y.; Sri Venkateswara Veterinary University, Hyderabad (India). College of Veterinary Science. Department of Animal Nutrition.Nagalakshmi, D; Sri Venkateswara Veterinary University, Hyderabad (India). College of Veterinary Science.Department of Animal Nutrition.Mahender, M.; Sri Venkateswara Veterinary University, Hyderabad (India). College of Veterinary Science. Department of Livestock Production and Management.. Effect of Feeding Sorghum Straw Based Complete Rations with different roughage to concentrate ratio on growth and carcass characteristics in Nellore Ram Lambs. Animal Nutrition and Feed Technology (India). (Sep 2014) v14(3) p.563-572 KEYWORDS: CARCASS COMPOSITION. RATIONS. FEED CONVERSION EFFICIENCY. SORGHUM. STRAW.

In order to find out the most suitable ratio of sorghum (Sorghum bicolor) straw: concentrate for optimum growth, production and carcass characteristics in Nellore ram lambs, a study was carried out by feeding sorghum straw based complete rations at the ratio of 70:30 (CR-I), 60:40 (CR-II), 50:50 (CR-III) and 40:60 (CR-IV) for 180d. The ADG was significantly (P<0.05) higher in CR-III and CR-V groups as compared to CR-I and CR-II. The FCR was lower (P<0.01) by 11.87, 16.91 and 22.54 per cent with CR-III, CR-II and CR-I rations, respectively, in comparison to CR-IV ration. The feed cost (H) per kg LW gain was significantly (P<0.01) higher in lambs fed CR-IV followed by CR-III, CR-II and was the lowest in CR-I. The dressing percentage expressed either on live or empty BW basis and per cent of leg, loin, rack,shoulder and neck and fore shank and brisket were similar (P<0.05)among the four groups; however, significant (P<0.01) difference was found among dietary groups in the lean, bone and fat contents of carcasses. Per cent weights of edible and non-edible organs and chemical composition of meat of the four experimental groups did not vary significantly. It is concluded that, inclusion of sorghum straw at 50–60% in the complete diets is considered to be economical in growing lamb's ration.

292. Grewal, R.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Tyagi,N.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Lamba, J. S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.Ahuja, C.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India).Department of Veterinary Physiology and Biochemistry.Saijipaul, S.;Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Department of Animal Nutrition.. Effect of bypass fat and niacin supplementation on the productive performance and blood profile of lactating crossbred cows under field conditions.. Animal Nutrition and Feed Technology



(India). (Sep 2014) v14(3) p.573- 581 KEYWORDS: BLOOD. LIPID CONTENT. DIGESTIBILITY. NICOTINAMIDE. PRODUCTION. REPRODUCTION.

A 120d field study was conducted on crossbred lactating cows to evaluate the production economics of supplemental bypass fat and niacin. Eighteen animals were randomly divided into two equal groups. The control group was fed wheat straw, concentrate mixture, bread waste, biscuit waste, mixed green fodder and baby corn waste while the treatment group received the same ration with additional 200g bypass fat and 12g niacin daily. Results of the in vitro evaluation of the feed ingredients indicated that the net gas production (ml/200mg DM) was similar in all the ingredients but the biscuit waste had highest truly degradable organic matter (TDOM). The concentrate mixture showed the highest microbial biomass production (MBP) and efficiency of MBP. The production data indicated that animals supplemented with bypass fat and niacin produced more milk (P0.06) with better persistency and feed efficiency (P0.05), higher milk fat (P0.05), and exhibited more EE digestibility (P0.01), blood glucose (P0.01) and total cholesterol (P0.01). The supplementation improved weight gain and conception rate. The study concluded that daily supplementation of bypass fat at 200 g/d along with 12g niacin in early lactation could be cost-effective for improving production and health of high producing dairy cows.

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

293. Naidu, Pradeep B.; NTR College of Veterinary Science, Gannavaram (India).Jagadeeswara Rao, S.; NTR College of Veterinary Science, Gannavaram (India).Prasad, R.M.V.; NTR College of Veterinary Science, Gannavaram (India).Anitha, A.; NTR College of Veterinary Science, Gannavaram (India).. Morphological characteristics of Vizianagaram Goats.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.49-51 KEYWORDS: GOATS. FARMERS. COATING. HORNS.

In a field study covering 240 farmers spread over 80 villages, in 16 mandals, data were collected on the morphological characteristics of local goats in Vizianagaram district of Andhra Pradesh. The predominant coat colour was bicolour (48.64%), followed by single colour (44.22%) and multi colour (7.14%). The bicolour pattern consisted of mainly black and white whereas, single coat colour pattern consisted of mainly black followed by white colour. The head profile of majority of local goats was straight (80.18%), followed by slightly convex (19.82%). Most of the goats (99.28%) had pendulous ears. Majority of goats (68.38%) did not have beard. Wattles were present in 50.88 per cent of goats and were present in both sexes. Both the sexes were horned (91.65%), but few were polled (8.35%).

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

294. Khan, M.H.; ICAR, Jharnapani (India). National Research Centre on Mithun.Natha, K.C.; ICAR, Jharnapani (India). National Research Centre on Mithun.Naskar, S.; ICAR, Jharnapani (India). National Research Centre on Mithun.Deka, B.C.; ICAR, Jharnapani (India).National Research Centre on Mithun.Kumar, Suresh; ICAR, Jharnapani (India). National Research Centre on Mithun.. Electron microscopic studies of porcine sperm: changes during freezing and post-thawing.Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.723-728 KEYWORDS:

#### MICROSCOPY. SEMEN. FREEZING. ULTRASTRUCTURE.

The aim of the present study was to characterize the ultrastructural changes in boar spermatozoa at different stages during freezing (fresh undiluted semen, after holding at 24°C, after cooling to 5°C and after equilibration at 5°C) and after thawing using transmission electron microscopy (TEM). The study was also aimed to compare the sperm characteristics observed through conventional staining procedure with that of electron microscopy. A total of 72 ejaculates were collected from 6 Hampshire boars. Pooled semen was extended in BTSLEYG (Beltsvelli thawing solution lactose egg yolk glycerol) extender and frozen in 0.5 ml French straws with conventional vapor freezing technique. Results of routine semen evaluation using conventional staining procedures seemed to be excellent. Microscopically assessed post-thaw percentage of progressively motile spermatozoa, live sperm count, spermatozoa with intact acrosome and hypo-osmotic reacted spermatozoa after thawing were  $51.38 \pm 0.87$ ,  $56.83 \pm 0.74$ ,  $56.83 \pm 0.74$  and  $43.79 \pm 0.83$ , respectively. TEM examination of frozen-thawed semen revealed major changes in the morphology of spermatozoa localized predominantly within the acrosome and post acrosomal region of a head. Acrosomal and membrane integrity as observed through conventional staining and TEM was found to be  $59.83 \pm 0.74$  vs  $37.88 \pm 8.85$  and  $43.79 \pm 0.83$  vs  $31.42 \pm 6.58\%$ , respectively. It may be concluded that freezing and thawing of boar semen resulted into maximum sperm damage and electron microscopy revealed major changes in acrosome and plasma membrane which could not be seen with conventional staining procedure.

295. Sangeeta, Sharon; Karnataka Veterinary, Animal and Fisheries Sciences University, Nandinagar (India). Kulkarni, S.; Karnataka Veterinary, Animal and Fisheries Sciences University, Nandinagar (India). Arangasamy, A.; ICAR, Bengaluru (India). National Institute of Animal Nutrition and Physiology. Selvaraju, S.; ICAR, Bengaluru (India). National Institute of Animal Nutrition and Physiology. Effect of amino acids on sperm motility, velocity parameters, plasma membrane integrity and lipid peroxidation levels at cooled and post-thawed ram epididymal semen. Indian Journal of Animal Sciences (India). (Jul2015) v.85(7) p.729-735 KEYWORDS: AMINO ACIDS. FREEZING. HOSTS. LIPID PEROXIDATION. RAMS.

This study is focused to look into the possibility of including amino acids during cryopreservation to improve the quality of frozen semen in sheep. Cauda epididymal semen was collected from 2-3-year-old Bannur crossbred rams slaughtered at the local abattoir. The semen samples were diluted in tris egg yolk glycerol diluent along with different additives and made into 7 aliquots. Aliquot 1 served as control, L-alanine was added 100 and 135mM in the aliquot 2 and 3, L-glutamine was added 20 and 25mM in the aliquot 4 and 5 and L-proline was added 25 and 50mM in the aliquot 6 and 7, respectively. Diluted semen was filled in 0.25 ml French straws, sealed manually and equilibrated at 4°C for 2 h, cooled in LN2 vapour before being plunged into LN2 till further evaluation. Inclusion of L-proline and L-glutamine in the diluent significantly increased the percent live sperm, total motility, lipid peroxidation and maintained higher functional membrane and acrosomal integrity than the control group. In contrast, L-alanine decreased the percentage of total motility, fast progressive spermatozoa and increased the percentage of immotile spermatozoa. It can be concluded that 20mM L-glutamine and 25mM L-proline can be used as semen additive to freeze ram epididymal semen as they prevented cryo injuries to

sperm and improved the pre-freeze and post-thaw semen characteristics.

296. Reetha Lurthu, T.; TANUVAS, Pudukottai (India). Regional Research Centre.Senthikumar, P.; TANUVAS, Pudukottai (India). Regional Research Centre.Jagtheesan Richard, P.N.; TANUVAS, Pudukottai (India). Regional Research Centre.. Productivity of Emus under Pen and Run system of Management.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.41-42  
KEYWORDS: EMUS. EGGS CHICKS. PRODUCTION POSSIBILITIES. HATCHING.

The eggs collected from four emu breeding pairs in two laying season maintained in the emu research unit at TANUV AS Regional Research Centre, Pudukkottai, Tamil Nadu were used for this study.The birds were maintained under standard manage mental practices. The mean egg production performance, the mean egg weight and the mean hatch weight of four emu pairs during 5th laying season were  $40.5\pm 3.22$ ,  $570.03\pm 4.17g$  and  $410.63\pm 5.66g$  respectively and the 6th laying season were  $30.75\pm 1.65$ ,  $583.46\pm 3.80g$  and  $414.14\pm 5.47g$  respectively. The hatching performance analysis of 5th laying season indicated that the per cent total egg hatchability, fertile hatchability and dead in shell were 72.66 , 93.5 and 6.93 respectively. The hatching performance of 6th laying season indicated that the per cent total egg hatchabil- ity, fertile hatchability, early embryonic mortality, late embryonic mortality and dead in shell were 36.6,52.5,9.8,5.35 and 15.17 respectively.

297. Premavalli, K.Ramamurthy, N.Omprakash, A.V.Balakrishnan, V.Rao Appa, V.. Influence of age on internal egg quality characteristics of Guinea fowl.. Indian Veterinary Journal (India). (Jul 2015) v.92(7)p.48-50  
KEYWORDS: AGE. LAYING PERFORMANCE. GUINEA FOWL.

Internal egg quality was assessed on 456 guinea fowl eggs collected from 20 to 95 weeks of age. Significant ( $P\sim 0.01$ ) increasing trend in egg weight, albumen index, Haugh unit and yolk index was observed as the age increased from 20 to 47 weeks and decline gradually thereafter to reach the lowest level between 56-59 weeks of age, then a second increasing trend was observed from 60 weeks upto 95 weeks of age coinciding with the peak trends of egg production.The present study suggested that the guinea fowl eggs had superior Haugh unit and yolk index.

298. Nath, I.; QUAT, Bhubaneswar (India). College of Veterinary and Animal Husbandry. Department if Veterinary Surgery and Radiology.Biswal Shuvranshu, Sh.; QUAT, Bhubaneswar (India). College of Veterinary and Animal Husbandry. Department if Veterinary Surgery and Radiology. Samantara, S.; QUAT, Bhubaneswar (India). College of Veterinary and Animal Husbandry. Department if Veterinary Surgery and Radiology.Successful management of egg bound condition in Indian Cobra (Naja naja).. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.62-63  
KEYWORDS: EGGS. HORMONAL CONTROL. SNAKES.

The present case report describes a rare case of egg bound condition in an Indian cobra (Naja naja) and its successful management by manual obstetrical maneuvers after hormonal induction failed to relieve the eggs.

299. Padhi, M.K.; ICAR-Project Directorate on Poultry, Hyderabad (India).Chatterjee, R.N.; ICAR-Project Directorate on Poultry, Hyderabad (India).Rajkumar, U.; ICAR-Project Directorate on Poultry, Hyderabad (India).Bhattacharya, T.K.; ICAR-Project Directorate on Poultry, Hyderabad (India).Bhanja, S.K.; ICAR-Project

Directorate on Poultry, Hyderabad (India).. Genetic and phenotypic parameters estimates for body weight, conformation, production and reproduction traits of PD1 (Vanaraja male line) during different periods.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.883-888 KEYWORDS: BODYWEIGHT. HERITABILITY. PRODUCTION. REPRODUCTION. BIRDS.

The present study was undertaken to investigate growth, conformation, production and reproduction performance of PDI (Vanaraja male line). The data collected for different periods from the birds were produced using 50 sires and 250 dams through pedigreed mating. Body weight was 640.21 g and shank length 75.39 mm at 6 weeks of age in pooled sex. In female the shank length increases faster up to 12 weeks of age and at 20 weeks it reached the maximum length, whereas other traits like body weight, keel length and breast angle increased up to 20 weeks of age. The ASM was 188 days and egg production up to 40 weeks of age was 46.29 eggs with egg weight at 40 weeks 54.61 g. The fertility % and hatchability % on total egg set and fertile egg set were 90.46, 83.20, and 91.38 %, respectively. The heritability estimates for juvenile body weight and conformation traits are low in magnitude. Growing period body weight showed moderate heritability estimates, whereas, conformation traits during growing period showed low to moderate heritability estimates. Egg production and age at sexual maturity showed low heritability estimates. Fertility and hatchability % showed moderate heritability estimates. Genetic and phenotypic correlation were estimated between different traits at different period and showed varying levels of correlations estimates. The results indicated that PDI line has the potential for further improvement and to be used as male line to produce backyard variety and to increase the performance of Vanaraja commercial.

300. Tudu, N.K.; Institute of Agriculture, Birbhum (India). Visva-Bharti.Pyne, S.K.; Institute of Agriculture, Birbhum (India). Visva-Bharti.Ghosh, N.; Bidhan Chandra Krishi Viswavidyalaya, Mohanpur (India).Dept. of Animal Science.. Reproduction characteristics of three color varieties of Bengal Goats.. Journal of Interacademia (India). (Apr2015) v19(2) p.293-300 KEYWORDS: GOATS. PRODUCTION. REPRODUCTION.

The present study was conducted in Nadia district of West Bengal during January, 2010 to December, 2013 with the specific objective to find out the reproduction characteristics, doe productivity traits and distribution of types of birth of three colour varieties of Bengal goats in their home tract. The age at first estrus, age at first conception, service required per conception, gestation length, age at first kidding and estrus interval were 203.41 days, 216.62 days, 1.27 days, 147.12 days, 370.15 days and 21.073 days in Black Bengal goats, 199.37 days, 205.15 days, 1.13 days, 147.11 days, 360.53 days and 20.042 days in Brown Bengal goats and 193.55 days, 200.25 days, 1.15 days, 144.35 days, 358.23 days and 18.835 days in White Bengal goats. The litter size at birth, litter weight at birth, litter weight at weaning and kidding interval were 1.80, 2.08 kg, 6.07 kg, 229.60 days, respectively in Black Bengal goats, 1.90, 2.30 kg, 6.95 kg and 228.10 days, respectively in Brown Bengal goats, and 1.80, 2.11 kg, 7.09 kg and 220.10 days, respectively in White Bengal goats. In case of Black Bengal goat out of total births recorded 38% were singlet, 52%

were twins and 10% were triplets. The respective figures were 31 % singlet, . 61% twins and 8% triplets in Brown Bengal goats, and 26% singlet, 56% twins and 18% triplets in White Bengal goats. So multiple births were more in White Bengal goat (74%) followed by Brown Bengal (69%) and Black Bengal goats (62%). From reproduction point of view, it can be said that White Bengal goats were better, followed by Brown and Black, especially in regard to kidding interval.

301. Talukdar, D.J.; College of Veterinary Science, Khanapara (India). Dept. of Animal Reproduction, Gynaecology & Obstetrics. Ahmed, K.; College of Veterinary Science, Khanapara (India). Dept. of Animal Reproduction, Gynaecology & Obstetrics. Sahara, J.; College of Veterinary Science, Khanapara (India). Dept. of Animal Reproduction, Gynaecology & Obstetrics. Das, G.C.; College of Veterinary Science, Khanapara (India). Dept. of Animal Reproduction, Gynaecology & Obstetrics. Hussain, J.; College of Veterinary Science, Khanapara (India). Dept. of Animal Reproduction, Gynaecology & Obstetrics.. Seasonal influence on the quality and freezability of semen of swamp Buffalo Bulls.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.46-48  
KEYWORDS: WATER BUFFALOES. SEMEN. FREEZING. SEASONS.

A study was conducted to record the basic information on seasonal influence on the quality and freezability of semen of four swamp buffalo bulls maintained at "Network Project on Swamp Buffalo, Department of AGB, College of Veterinary Science, Khanapara, Guwahati. The year was divided into summer (June to August), autumn (September to November), winter (December to February) and spring (March- May) on the basis of meteorological data of the area. Each ejaculate was collected biweekly by AV method to record the ejaculate volume, mass activity, initial sperm motility, sperm concentration, live sperm, total HOST reacted sperm, live intact acrosome, sperm abnormality percentage. After collection the semen samples were extended with Tris-egg yolk- citrate glycerol extender before filling in 0.25 ml French straws and assessed the freezability by examining the percentage of progressively motile spermatozoa. The results revealed that the effect of seasons was found to be significant for ejaculate volume (P 0.01). initial sperm motility (P 0.05), sperm concentration (P 0.01), and total head abnormalities (P 0.05). The ejaculate volume and sperm concentration was significantly (P 0.01) higher during summer season. The initial sperm motility was significantly (P 0.01) lower and the incidence of head abnormalities significantly (P 0.05) higher during winter season.

302. Dhawan, S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding. Yadav, A.S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding. Dhaka, S.S.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding. Chakraborty, D.; LLRUVAS, Hisar (India). Dept. of Animal Genetics & Breeding.. Genetic studies on reproduction traits in Sahiwal cattle.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.32-35  
KEYWORDS: GENETIC INHERITANCE. REPRODUCTION. CATTLE.

The present investigation was undertaken on reproductive records of 815 Sahiwal cows from Government Livestock Farm (GLF), Hisar distributed over 36 years (1975 to 2010). The period of calving were significant (P 0.01) on all the traits under study except for FDP. The season of calving had significant effect on all the traits under study. The effect of age at first calving (Linear) was significant on ASC only. Autumn calvers were better for different reproductive traits. The estimates of heritability were medium to high. All genetic and phenotypic

correlations among different reproduction traits were high except for AFC and FDP.

303. Naha, B.C.; National Dairy Research Institute, Karnal (India). Dairy cattle Breeding Division.Chakravarty, A.K.; National Dairy Research Institute, Karnal (India). Dairy cattle Breeding Division.Mir, M.A.; National Dairy Research Institute, Karnal (India). Dairy cattle Breeding Division.Gupta, A.K.; National Dairy Research Institute, Karnal (India). Dairy cattle Breeding Division.. Evaluation of sire conception rate in sahiwal breeding Bulls.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.70-71 KEYWORDS: REPRODUCTIVE PERFORMANCE. BULLS. EVALUATION.

In the present investigation, sire conception rate of Sahiwal breeding bulls had been studied. The study was based on records of 43Sahiwal bulls maintained under 8 sets of Sahiwal breeding project at National Dairy Research Institute, Karnal Haryana (India). The data on sire conception rate of Sahiwal bulls during (1987- 2013) were analysed. The results revealed that the average overall conception rate of Sahiwal bulls was estimated as  $46.38 \pm 1.55$  % with the coefficient of variation of 22.32%. The average sire conception rate of Sahiwal breeding bulls ranged from - 4% to + 6 %.

304. Kumar, Suresh; ICAR Research Complex for NEH Region, Meghalaya (India).Gedam, Sonal; ICAR Research Complex for NEH Region, Meghalaya (India).Biswas, R.K.; ICAR Research Complex for NEH Region, Meghalaya (India).Purkayastha, A.; ICAR Research Complex for NEH Region,Meghalaya (India).devi, Bhanita; ICAR Research Complex for NEH Region, Meghalaya (India).Bharti, P.K.; ICAR Research Complex for NEH Region, Meghalaya (India).Doley, S.; ICAR Research Complex for NEH Region, Meghalaya (India).Kadirvel, G.; ICAR Research Complex for NEH Region, Meghalaya (India).. Effect of hormones, follicular fluid,serum and media on in vitro maturation of porcine oocyte.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.958-961 KEYWORDS: HORMONES. OVA. SWINE. BLOOD PROTEINS.

The present study was conducted to evaluate the effect of hormones, follicular fluid, serum and media on in vitro maturation (IYM) of porcine oocyte. The procedures of IYM could be used for basic research purposes or commercial utilization. The IYM of oocyte is a critical step in in-vitro embryo production and it needs to be carried out in a precise manner under optimal conditions for subsequent fertilization and embryo development. For this purpose ovaries were collected from slaughtered pigs from an abattoir.Ovaries (1,232) were aspirated in 52 trials for IYM and fertilization for this study. Dulbecco Modified Eagle's medium (DMEM) or tissue culture medium (TCM-199) supplemented with gentamycin (50IU/ml), sodium pyruvate (100 mmol) and 10% serum, viz. estrus sow serum (ESS) or fetal calf serum (FCS) with or without porcine follicular fluid(PFF) and hormones such as pregnant mare serum gonadotropin (PMSG)and human chorionic gonadotropin (HCG) were used. The maturation was assessed by loosening of cumulus cells, enlargement of peri-viteline space or extrusion of first polar body and examination of metaphaseII by aceto-orcein stain. The results revealed that DMEM with ESS yielded 53% while TCM+ESS yielded 45% maturation rates. The replacement ofESS with FCS resulted in 48.50 and 35.33% maturation in DMEM and TCM- 199 medium, respectively. The addition of PFF in DMEM+ESS improved the maturation rate and was found better (74.55%) than TCM-199+ESS (65.35%). However, the replacement of ESS by FCS in either

DMEM or TCM-199+PFF did not differ significantly. It can be concluded from the present study that use of DMEM+ESS+PFF along with hormones PMSG + luteinizing hormone (LH) for first 20- 24 h followed by hormone free medium for next 20- 22 h i.e. 42-44 h gave optimum(81.5%) in-vitro maturation rates in pigs. DMEM with ESS and PFF with hormone (PMSG/HCG) yielded highest maturation (81.50%) rate than TCM-199 with ESS, PFF and hormone (PMSG/HCG) which showed maturation rate of 76.59%.

305. Bharti, P.K.; Indian Veterinary Research Institute, Izatnagar (India).Dutt, Triveni; Indian Veterinary Research Institute, Izatnagar (India).Patel, B.H.M.; Indian Veterinary Research Institute, Izatnagar (India).Pandey, H.O.; Indian Veterinary Research Institute, Izatnagar (India).Tomar, A.K.S.; Indian Veterinary Research Institute, Izatnagar (India).. Does age at weaning influences behavior of Murrah buffalo calves under semi-intensive management conditions ?. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1031-1036 KEYWORDS: CALVES. WATER BUFFALOES. BEHAVIOUR. SUCKLING. WEANING.

The purpose of the study was to compare the behaviour of neonatal Murrah buffalo calves reared under weaning and suckling methods. Initially, 42 newly born calves were selected and they were equally but alternately assigned into 3 groups as suckling (Gr 1), weaning at birth (Gr 2) and weaning on 45th day (Gr 3). The different behavioural parameters of calves were recorded for first 15 days of suckling/weaning during each milk-feeding hour. The average daily milk intake of calves was significantly lower in Gr I than Gr 3 but higher than Gr 2. The time taken by calves for milk consumption was significantly higher in Gr 3 than Gr 1 or Gr 2. The learning time for self- feeding in Gr 2 was significantly higher than Gr 3 and Gr 1. The incidence of inter-suckling was significantly higher in Gr 3 than Gr 1 (11.49%) and Gr 2 (59.08%). The incidence of defecation and urination was non significantly higher in suckling than weaning groups. The total suckling score was significantly higher in Gr 3 than Gr I and Gr 2. Weaning in buffalo calves at birth yielded more success rate than weaning at 45th day. This study highlights deeper understanding of weaned calf behaviour which can be useful for adopting weaning management practice in buffaloes to promote clean milk production and to get other established benefits of weaning similar to dairy cattle.

306. Gokuldas, P.P.; ICAR-National Research Centre on Pig, Guwahati (India).Tamuli, M.K.; ICAR-National Research Centre on Pig, Guwahati (India).Mohan, N.H.; ICAR-National Research Centre on Pig, Guwahati (India).Barman, K.; ICAR-National Research Centre on Pig, Guwahati (India).Sahoo, N.K.; ICAR-National Research Centre on Pig, Guwahati (India).. A comparative analysis of reproductive performance of different pig breeds under intensive management systems in sub-tropical climate.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1042-1045 KEYWORDS: BREEDS (ANIMALS). MANAGEMENT. REPRODUCTIVE PERFORMANCE. SOWS.

A comparative study was undertaken to evaluate the reproductive performance of various pig breeds reared under intensive system of rearing in sub-tropical climate. Trends in reproductive performance were studied in different breeds with respect to age at puberty and first fertile service, weaning to estrus interval (WEI), farrowing interval, litter size and farrowing indices. Analysis of data revealed earlier age at puberty in Ghungroo ( $7.8 \pm 0.41$  months) and crossbred pigs ( $7.86 \pm 0.17$  months). Correspondingly, age at first fertile

service were earlier in crossbred sows (8.94±0.16 months) and Ghungroo (9.3±0.43 months). In general, an extended WEI could be observed in all breeds and the delay was more pronounced in primiparous compared to multiparous sows. Litter size at birth was significantly higher in Ghungroo (8.7±0.25) and crossbreds [HS x GH(8.5±0.48) and HS x NM (8.2±0.55)] in comparison to other groups. Average numbers of piglets weaned per sow were significantly higher in Ghungroo sows and its crosses. Average pre-weaning mortality was found to be significantly lower in crossbreds with Hampshire-desi crosses having the lowest rate (2.94%). Out of all groups, crossbreds had a higher farrowing index value of 2.01 while indigenous breeds had a relatively lower farrowing index (1.72). Significant influences of different genetic groups on various reproductive variables were observed in the present study while environmental factors and selection practices also appeared to contribute overall variations in the reproductive performance.

## L72 Pests of animals

307. Ravindran, Reghu; College of Veterinary and Animal Sciences, Wayanad (India).Chithra, Nayikottummal Devadas; College of Veterinary and Animal Sciences, Wayanad (India).Deepa, Pattanpur Edathil; College of Veterinary and Animal Sciences, Wayanad (India).Juliet, Sanis; College of Veterinary and Animal Sciences, Wayanad (India).Kumar, Karapparambu Gopalan Ajith; College of Veterinary and Animal Sciences, Wayanad (India).Nair, Suresh Narayanan; College of Veterinary and Animal Sciences, Wayanad (India).Udayan, Darsana; College of Veterinary and Animal Sciences, Wayanad (India). Nanjudappa, Sathish; College of Veterinary and Animal Sciences, Wayanad (India).Chandrasekhar, Leena; College of Veterinary and Animal Sciences, Wayanad (India).Ghosh, Srikanta; College of Veterinary and Animal Sciences, Wayanad (India).. Contrasting effects of ethanolic extracts of leaf and flower of *Chromolaena odorata* against *Rhipicephalus (Boophilus) annulatus*.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.844-848 KEYWORDS: LEAVES. FLOWERS. CHROMOLAENA ODORATA. RHIPICEPHALUS.

In the present study, ethanolic extracts of leaves and flowers of *Chromolaena odorata* were compared at different dilutions (6.2mg/mL, 12.5 mg/mL, 25 mg/mL, 50 mg/mL and 100 mg/mL) for their efficacy against ticks. Per cent adult mortality, inhibition of fecundity and hatching of laid ova were studied. Leaf extract did not cause any adult tick mortality. The negative values for the per cent inhibition of fecundity observed with the leaf extract indicated that it promoted egg laying. On the contrary, the ethanolic extract of flowers at 10% concentration caused 62% adult tick mortality and 80%inhibition of fecundity. However, both extracts did not produce any change in the hatching of the laid ova by treated ticks.

308. Chaudhary, J.H.; AAU, Anand (India). Veterinary College. Dept. of Veterinary Public Health and Epidemiology.Nayak, J.B.; AAU, Anand (India). Veterinary College. Dept. of Veterinary Public Health and Epidemiology.Brahmbhatt, M.N.; AAU, Anand (India). Veterinary College. Dept. of Veterinary Public Health and Epidemiology.Makwana,P.P.; AAU, Anand (India). Veterinary College. Dept. of Veterinary Public Health and Epidemiology.. Prevalence of *Salmonella* species from pork and slaughter house environment in Ahmedabad, Gujarat.Indian Veterinary Journal (India). (Sep 2015) v92(09) p.72-73 KEYWORDS: SALMONELLA.



PORK. INFECTION. ABATTOIRS.

A total of 270 samples (pork muscles, tonsils, rectal swab, lymph node, liver, intestine, water, knife swab and butchers' hand swabs (30 sample each) collected from Slaughter house environment in Ahmedabad city (Gujarat). 13.70 per cent (37/270) samples were found positive for Salmonella spp. Salmonella enterica serovars Typhimurium and Enteritidis were the detected serovars. All the isolates were found positive by biochemical reactions. The findings of the present study confirm prevalence of Salmonella spp. in pork and Slaughter house environment samples therefore owing to the potential human health.

309. Khatoon, Sanweer; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Kolte, S.W.; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Jahan, Afroz; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Prajapati, B.S.; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Kurkure, N.V.; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Bhandarkar, A.G.; Maharashtra Animal & Fishery Sciences University, Nagpur (India). Nagpur Veterinary College. Dept. of Veterinary Parasitology. Studies on the occurrence of *Cysticercus fasciolaris* (*Strobilocercus*) infections in laboratory rats (*Rattus norvegicus*) in Nagpur.. Indian Veterinary Journal (India). (Sep 2015) v92(09)p.82-83 KEYWORDS: RATS. TAENIA TAENIAEFORMIS. INFECTIOUS DISEASES.

*Cysticercus fasciolaris* (*Strobilocercus*), larval stage of *Taenia taeniaeformis*, is having a zoonotic importance as important rodent parasite. In a month round study on 10 laboratory rats, on P-M examination 5 were having white nodules on liver surface later identified as *Cysticercus fasciolaris* (*Strobilocercus*) based on morphological characteristics. Intestinal parasites were identified as *Hymenolepis diminuta*.

310. Bauri, R.K.; Indian Veterinary Research Institute, Izatnagar (India). Chandra, Dinesh; Indian Veterinary Research Institute, Izatnagar (India). Lalrinkima, H.; Indian Veterinary Research Institute, Izatnagar (India). Raina, O.K.; Indian Veterinary Research Institute, Izatnagar (India). Tigga, M.N.; Indian Veterinary Research Institute, Izatnagar (India). Kaur, Navneet; Indian Veterinary Research Institute, Izatnagar (India).. Epidemiological studies on some trematode parasites of ruminants in the snail intermediate hosts in three districts of Uttar Pradesh, Jabalpur and Ranchi. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.941-946 KEYWORDS: EPIDEMIOLOGY. TREMATODA. PARASITES. RUMINANTS. SNAILS.

Seasonal prevalence of 5 trematode parasites in the 4 snail species, viz. *Lymnaea auricularia*, *L. luteola*, *Gyraulus convexiusculus* and *Indoplanorbis exustus* for the years 2012-2014 was studied in 3 districts of Uttar Pradesh and in Jabalpur and Ranchi districts of Madhya Pradesh and Jharkhand, respectively. Intramolluscan larval stages of *Fasciola gigantica*, *Explanatum explanatum*, *Paramphistomum epiclitum*, *Fischoederius elongatus* and *Schistosoma spindale* were identified using ITS-2, 28S rDNA, 12S mitochondrial (mt) DNA and Cox I markers. *F. gigantica* infection in *L. auricularia* had a significant (P<0.05)

occurrence in the winter season followed by rains. Seasonality of *P. epiclitum* transmission in *I. exustus* was observed with significant occurrence of its infection in the rainy season followed by a sharp decline in other seasons. Prevalence of *S. spindale* infection in *I. exustus* was insignificant in 3 districts of Uttar Pradesh but highly prevalent in other 2 districts. Infection with *F. elongatus* in *L. luteola* was recorded in different seasons. *G. convexiusculus* were screened for *E. explanatum* and *Gastrothylax crumenifer* infection and a significant rate of infection with *E. explanatum* was observed in the rainy season. Climatic factors including temperature and rainfall influence the distribution of snail populations and transmission of trematode infections by these snail intermediate hosts.

### **L73 Animal diseases**

311. Krishnamoorthy, P.; ICAR, Begaluru (India). National Institute of Veterinary Epidemiology and Disease Informatics. Patil, S.S.; ICAR, Bengaluru (India). National Institute of Veterinary Epidemiology and Disease Informatics. Shome, Rajeshwari; ICAR, Begaluru (India). National Institute of Veterinary Epidemiology and Disease Informatics. Rahman, H; ICAR, Begaluru (India). National Institute of Veterinary Epidemiology and Disease Informatics.. Sero- epidemiology of infectious bovine rhinotracheitis and brucellosis in organized dairy farms in southern India.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.695-700 KEYWORDS: EPIDEMIOLOGY. BOVINE HERPESVIRUS. BRUCELLOSIS. DAIRY FARMS.

The present study was conducted to know the seroprevalence of infectious bovine rhinotracheitis (IBR) and brucellosis and its epidemiology in organised dairy farms in southern India. Sera samples (559 cattle and 161 buffaloes) were collected from 6 organised dairy farms in southern India. Samples were screened for IBR by avidin biotin ELISA and brucellosis by RBPT and Indirect ELISA. The overall apparent prevalence were 61.54%, 10.20% and 11.63% for IBR, Brucella by RBPT and iELISA respectively. The state-wise seroprevalence showed highest in Andhra Pradesh for IBR and Karnataka for both IBR and brucellosis; lowest in Tamil Nadu for both the diseases. There was no significant difference in male and female in seroprevalence of these diseases. Crossbred cattle showed high seroprevalence for IBR and Brucella antibodies when compared to indigenous cattle breeds. Buffaloes showed increased seroprevalence for IBR and Brucella when compared to cattle. The IBR seropositive animals showed positive relationship with increase in age. Animals with history of abortions showed seroprevalence of 100% for IBR and 40-50% for brucellosis. The animals with history of reproductive problems showed increased seroprevalence when compared to apparently healthy bovines. The seropositivity for both IBR and brucellosis were 2.76% and 29.19% in cattle and buffaloes, respectively and with overall seropositivity of 10.38%. Thus IBR and brucellosis seroprevalence has increased over the years and there is a need to tackle these diseases effectively by zoonosanitary measures and control programmes in organised dairy farms which would benefit the dairying in Southern India.

312. Sethi, menaka; Indian Veterinary Research Institute, Izatnagar (India) Agarwal, Swati; Indian Veterinary Research Institute, Izatnagar (India) Ray, Pradeep Kumar; Indian Veterinary Research Institute, Izatnagar (India) Anoopraj, R.; Indian Veterinary Research Institute, Izatnagar (India) Saikumar, G.; Indian Veterinary

Research Institute, Izatnagar (India). PCV2 load in preweaned piglets affected with porcine circovirus 2 associated diseases. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.701-704 KEYWORDS: SWINE. CIRCOVIRIDAE. VIRUSES.

Porcine circovirus associated diseases (PCVAD) caused by Porcine circovirus type 2 (PCV2) are responsible for heavy losses to the global swine industry in recent decades. PCV2 viral load varies significantly between diseased and subclinically infected pigs. Real time PCR is a highly sensitive technique enabling simultaneous amplification and quantification of specific nucleic acid sequences. Using this technique, the distribution and absolute quantification of PCV2 in naturally infected preweaned piglets was investigated. The viral load in different organs was in the range of (32.92x 10<sup>8</sup>copies/1lg DNA to 1.14x 10<sup>8</sup>copies/1lg DNA). Results indicate that in PCVAD affected pre weaned pigs, lymphoid organs contain the highest viral loads, while intestine and brain the lowest viral loads. This preliminary data on virus load in the lymphoid organs of preweaned piglets will help differentiate mere PCV2 infection and clinical PCVAD.

313. Rialch, Ajayta; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Vatsya, Stuti; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Kumar, Rajeev Ranjan; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India).. Benzimidazole resistance in gastrointestinal nematodes of small ruminants of Uttarakhand.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.714-718 KEYWORDS: ANTHELMINTICS. BENZIMIDAZOLES. NEMATODA. GOATS. SHEEP.

The status of benzimidazole (BZ) resistance in gastrointestinal nematodes (GIN) was studied in a total of four flocks of sheep namely UTs1, UTs2, UTs3 (Uttarkashi district) and Bsl (Bageshwar district) and four goat flocks namely UTgl, UTg2, (Uttarkashi district) and Bgl (Bageshwar district) and Ugl (U.S. Nagar district) of Uttarakhand state using egg hatch assay (ERA) and larval development assay (LDA). ERA detected resistance in two out of eight flocks (UTs3 and Ugl). Arithmetic mean and range of ED<sub>50</sub> value of susceptible group was found to be 0.0431lg/rni and 0.020-0.0631lg/ml, respectively, and the same for resistant group were found to be 0.1211lg/ml and 0.102-0.1411lg/ml, respectively. The arithmetic mean and range of ED<sub>99</sub> value of susceptible group was recorded as 0.2951lg/ml and 0.170-0.5001lg/ml, respectively, and that of resistant group was observed to be 2.9701lg/ml and 1.794-4.1461lg/ml, respectively. The arithmetic mean and range of LC<sub>50</sub> value of susceptible group was found 0.0031lg/ml and 0.002-0.0031lg/ml, respectively, and those of resistant group was found 0.0501lg/ml and 0.010- 0.0111lg/ml, respectively. While the arithmetic mean and range of LC<sub>99</sub> value of susceptible group was found to be 0.0101lg/ml and 0.007-0.0111lg/ml, respectively and those of resistant group was observed to be 0.7841lg/ml and 0.409-1.1591lg/ml, respectively. Pooled coproculture examination revealed the presence of predominantly *Haemonchus contortus*, followed by *Trichostrongylus* spp., *Oesophagostomum* and *Strongyloides*, while infective larvae that survived in wells having higher concentrations of Thiabendazole were all *Haemonchus* with few *Trichostrongylus*. BZ resistance has not been reported earlier against *Trichostrongylus* spp. from Uttarakhand. For effective management of GIN in small ruminants, evaluation of efficacy of anthelmintics is important to regularly monitor anthelmintic resistance. The baseline information thus generated will enable timely management of benzimidazoles resistance in GIN.

314. Das Ananta, Kumar; Central Avian Research Institute, Izatnagar (India).Kumar, Sanjeev; Central Avian Research Institute, Izatnagar (India).Rahim, Abdul; Central Avian Research Institute, Izatnagar (India).Kokate Laxmikant, Sambhaji; Central Avian Research Institute, Izatnagar (India).Mishra Anil, Kumar; Central Avian Research Institute, Izatnagar (India).. Association study of some immunological traits with layer performances in Rhode Island Red chicken lines.. Indian Journal of Animal Sciences (India). (Jul 2015)v.85(7) p.796-799 KEYWORDS: CHICKENS. = EGG CHARACTERS. BODY WEIGHT. BLOOD PROTEINS.

This investigation aimed to study association of some immunological traits with layer performances in Rhode Island Red (RIR) chicken lines at experimental layer farm of this institute Five to six weeks aged pedigreed RIR chicks of selected and control lines were immunized against 1 % (v/v) sterile sheep erythrocytes suspension (SRBC) to assess humoral immune response through haemagglutination (HA) test. Serum lysozyme and immunoglobulin-G(IgG) concentrations were estimated through agarose lysoplate and single radial immunodiffusion assays. HA titre, serum lysozyme and IgG concentrations were classified in high, medium and low levels based on their means and standard deviations. Layer performance data under various immunocompetence levels were analyzed by least squares analysis of variance. Pullets having high HA titre and serum IgG levels laid heavier eggs at 40th week of age than those with medium or low levels of HA titre and serum IgG in the selected line. Again, hens of the selected line containing high and medium serum IgG levels also laid heavier eggs at 28th week than those with low IgG level. Birds of the control line containing high serum JgG level had heavier body weights at 20th week of age than those with medium IgG level.This generated some valuable information that might be used in the genetic improvement programme of the chicken production and protection status.

315. Singh, D.; Central Sheep and Wool Research Institute, Avikanagar (India).Swarnkar, C.P.; Central Sheep and Wool Research Institute, Avikanagar (India).Sanyal, P.K.; College of Veterinary Science and Animal Husbandry, Anjora (India).. Dynamics of epidemiological intelligence for exploitation in effective worm management in sheep-A Rajasthan experience.. Indian Journal of Animal Sciences (India). (Jul 2015) v.85(7) p.679-694 KEYWORDS: EPIDEMIOLOGY. SHEEP. ANTHELMINTICS. NEMATODE INFECTIONS.

Being of ubiquitous nature and omnipresence of the gastrointestinal (GI) parasites, their management presents a difficult challenge following wide-spread emergence of anthelmintic resistance. Anthelmintics have a definite role to play in worm management but their frequency of use should be minimised to the extent possible and the available resources of anthelmintics could be used judiciously by exploiting the knowledge of parasite epidemiology. The present communication discusses different aspects of worm biology and their interaction with environment, host and managerial practices. The bioclimatographs suggested existence of suitable conditions for translation of exogenous stages of *Haemonchus contortus* from late May to late September in semi-arid region and from mid June to late August / September in arid region. Based on real-time observations, different strategies were developed and tested for efficient management of GI nematodes in sheep flocks of Rajasthan. The agro-climatic conditions and lambing pattern do not favour the development of strongyle larvae during December-June, resulting in absence of typical peri-parturient rise

in faecal egg counts (FECs). However, the epidemiology of strongyle worms showed the possibility of hypobiosis. An initial rising trend in FECs in June could be probably due to resumption of development of hypobiotic worms within the host, giving peak of infection in July and providing the source of pasture contamination during monsoon. The decline in FECs in the following months may be due to spontaneous occurrence of self-cure phenomenon. The GI parasite populations in small ruminants are highly aggregated and over-dispersed, with around 80% of the worms found in only 20-30% of the host. Thus, requirement for treatment is a reflection of the genetic basis of host variation in either innate or acquired resistance to parasites or resilience. The over-dispersion phenomenon was used in the form of targeted selective treatment and for breeding for resistance / resilience to parasites ultimately with the aim to increase the size of refugia, maintain anthelmintic efficacy and cost-effective worm management.

316. Sharma, Ashwani Kumar; GADVASU, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Medicine. Chand, N.; GADVASU, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Medicine. Singh, R.S.; GADVASU, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Medicine. Bnasal, B.K.; GADVASU, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Medicine. Kumar, Ashwani; GADVASU, Ludhiana (India). College of Veterinary Sciences. Department of Veterinary Medicine. Effect of Praziquantel in the treatment of Hydatidosis in Cattle and Buffaloes. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.11-13  
KEYWORDS: ECHINOCOCCOSIS. CATTLE. WATER BUFFALOES. SYMPTOMS.

The study was conducted on cattle and buffaloes presented to university Teaching Veterinary Hospital for hydatidosis on radiograph of their lungs. The animals were subjected to comprehensive clinical examination, haematology, ultrasonography of lungs, liver and reticulum, and CSF analysis in animals showing nervous signs. Affected animals treated either with broad spectrum antibiotics (n=7), fenbendazole (n=7) 7.5mg/kg six times on alternate days or mebendazole (n=6) 0mg/kg seven times on alternate days, showed no improvement. However, animals treated with praziquantel (n=12) mg/kg single dose recovered clinically with return to normal production. Repeated radiography of lungs after 45-120 days revealed no change in size of cysts in recovered animals.

317. Sharma, Ankur; SKUAST-J, Jammu (India). FVSc & AH. Division of Veterinary Sugery and Radiology. Bharadwaj, H.R.; SKUAST-J, Jammu (India). FVSc & AH. Division of Veterinary Sugery and Radiology. Comparative efficacy of surgical resection, chemotherapy and autoimmunotherapy in treatment of Cutaneous Pappilomatosis in Cattl. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.16-18  
KEYWORDS: DRUG THERAPY. IMMUNOTHERAPY. PAPILOMA. CATTLE.

Papillomas in twenty adult cattle were treated with surgical excision, anthiomaline injection, autogenous vaccine and keeping a control group. Recurrence was observed in one animal each of surgical and medicinal group and spontaneous regression of warts in two animals of control group was observed. Treatment by autoimmune therapy gave best results; however, for optimum efficacy it is suggested to combine two treatment protocols. Tumours of cutaneous or mucosal epithelia known as pappillomas or warts are a common disease of young cattle, frequently associated with Bovine

papillomaviruses(BPV) (Nasir and Campo, 2008). They are manifested as benign tumours which tend to regress spontaneously (Borzaccheillo and Roperto,2008). Occasionally, BPV persists and provides focus for malignant transformation to squamous cell carcinoma, particularly in presence of additional critical genetic or environmental cofactors (Campo,1997). The present study was carried out to find out suitable treatment of these warts.

318. Jhambh, R.; Indian Veterinary Research Institute, (Bareilly). Division of Medicine.Dimri, U.; Indian Veterinary Research Institute, (Bareilly). Division of Medicine.Yatoo, M.I.; Indian Veterinary Research Institute, (Bareilly). Division of Medicine.Kumar, Parveen; Indian Veterinary Research Institute, (Bareilly). Division of Medicine.. In vitro antioxidant activity of Zingiber officinale extracts and its safety study in rats.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.19-21 KEYWORDS: ZINGIBER OFFICINALE. EXTRACTS. ANTIOXIDANTS. RATS.

The antioxidant activity of aqueous and ethanolic extracts of Zingiber officinale roots was evaluated by Iron to Iron reducing activity and ability to inhibit ascorbate-Iron-catalyzed hydroxyl radical mediated phospholipids peroxidation which revealed ethanolic extract better for its antioxidant activity that was subjected to safety study in rats. The rats were randomly allocated to four treatment groups of no treatment, ethanolic extract of Zingiber officinale orally at dosage of 50, 100 and 200 mg/kg b.wt.respectively daily for 30 days which revealed dosage of 50 mg/kg to be safest and protective to rats that may be used in various disease conditions in animals for its antioxidant potential.

319. Jayachandran, C.; Biah Veterinary College, Patna (India). Department of Veterinary Pharmacology and Toxicology.Nirala, R.K.; Biah Veterinary College, Patna (India). Department of Veterinary Pharmacology and Toxicology.. Pharmacokinetics of Cefazolin in healthy and fertile female Buffalo calves.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.30-33 KEYWORDS: WATER BUFFALOES. CALVES. HEALTH.

The study revealed faster distribution and quicker removal of cefazolin under febrile condition since significantly (P0.05) low distribution half life ( $t_{1/2}$ ) of  $0.12 \pm 0.02$  h and higher rate of elimination from central compartment (Kel) of  $3.394 \pm 0.608$  h<sup>-1</sup> in febrile buffalo calves as compared to  $0.31 \pm 0.06$  and  $1.184 \pm 0.249$ h<sup>-1</sup> in healthy animals. This is supported by significantly higher(P0.01) concentrations of the drug in urine from 0.08 to 0.5 h in febrile buffalo.

320. Palanisamy, M.Napoleam Ezakial, R.Selvaraju, M.Balasubramanian, G.A.Krishnakumar, K.Manokaran, S.. Efficacy of immunomodulators, Lugol's Iodine and PGF2 on the bacterial load in the endometritis affected cows.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.56-58 KEYWORDS: IODINE. PROSTAGLANDINS. BACTERIA. COWS.

The present study was conducted to assess the efficiency of immunomodulators in controlling the microbial load in endometritis cows in comparison with Lugol's Iodine (LI) and Prostaglandin F2a(PGF2a). A total of 72 cross-bred cows divided equally in to six groups viz. Group I - treated with 30 ml of 2 per cent Lugol's iodine for 3 days, Group II, III and IV - single intrauterine dose of 30 ml PBS containing 100 ug of E. coli LPS, 2 mg of L YZs and 500 mg of OG, respectively, Group V - 25 mg of PGF2a and Group VI- control cows given 30 ml ofPBS intra- uterine. The bacterial colony counts recorded were significantly

(P:::;O.OI) reduced after treat- ment. The elimination of bacterial load was better in the immunomodulator treated groups than other groups. E.eoli LPS was found to be most effective in controlling uterine infections followed by L YZ and OG.

321. Jayanthi, D.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.Murali, N.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.Arun, L.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.Senthilkumar, P.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.Udhayavel, S.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.Rekha, B.; TANUVAS, Pottaneri (India). Mecheri Sheep Research Station.. Correction of rectal prolapse in Salem Black kid.. Indian Veterinary Journal (India). (Jul2015) v.92(7) p.63-64 KEYWORDS: DIGESTIVE SYSTEM DISEASES. DISEASE CONTROL.

A five weeks old Salem black female kid was referred with a history of dullness, cough, strain- ing for defecation/urination and protrusion of red coloured mass from the anus. On clinical examination, protrusion of rectal mucosa was observed. The kid was stabilized, the prolapsed rectal mucosa was cleansed, repositioned and retained by purse-string suture. The animal recovered with normal defecation and urination.

322. Singh, Satyaveer; Mahatma Gandhi Veterinary Collge, Bharatpur (India). Department of Veterinary Surgery and Radiology.Bharti, B.;Mahatma Gandhi Veterinary Collge, Bharatpur (India). Department of Veterinary Surgery and Radiology.. Management of complete hoof capsule avulsion in a Foal: A case report.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.64-65 KEYWORDS: HOOVES. FOALS. MANAGEMENT.

A six month old foal was presented with the history of accidental injury by automobile on his right fore limb and whole hoof get avulsed with bleeding and slight portion of the coronary band was present. Foal was sedated with Xylazine hydrochloride 0.5mg/kg b.w.t and Butorpha- nol tartar ate 0.Olmg/kg b.wt, IN and treated with inj.- Haemocoagulase 1.5ml, IN, Tetanus Toxoid 2.5 ml, 11M, procaine penicillin 20000 IU/kg bwt, 11M, phenylbutazone 4.4mg/kg bwt, IN and dressing of injured area with help of 0.5% povidone iodine solution and sufficient padding and bandaging of the exposed sensitive part of foot was done. For the next seven days, treatment was continued.Wound was healed and complete recovery occurs after eight months of injury.

323. Manokaran, S.; Vaterinary College and Research Institute, Namakal (India). Department of Animal Reproduction, Gynaecology and Obstetrics.Palanisamy, M.; Vaterinary College and Research Institute, Namakal (India). Department of Animal Reproduction, Gynaecology and Obstetrics.Selvaraju, M.; Vaterinary College and Research Institute, Namakal (India). Department of Animal Reproduction, Gynaecology and Obstetrics.Prabaharan, V.; Vaterinary College and Research Institute, Namakal (India). Department of Animal Reproduction, Gynaecology and Obstetrics.Napolean Ezakial, R.; Vaterinary College and Research Institute, Namakal (India). Department of Animal Reproduction, Gynaecology adn Obstetrics.. Dystocia due to Fetal Giantism with Brachygnathism in a Sirohi Ewe.. Indian Veterinary Journal (India).(Jul 2015) v.92(7) p.66-67 KEYWORDS: CAESAREAN SECTION. DYSTOCIA.

A rare case of fetal giantism with brachygnathism in a Sirohiewe

caused dystocia was treated by cesarean section and is reported.

324. Kumbhakar, N.K.; Chhattisgarh Kamdhenu Vishwavidyalaya, Anjora ( India). College of Veterinary Science and Animal Health. Department of Veterinary Parasitology. Dewangan, B.K.; Chhattisgarh Kamdhenu Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Health. Department of Veterinary Parasitology. Kumar, Bhupendra; Chhattisgarh Kamdhenu Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Health. Department of Veterinary Parasitology. Sanyal, P.K.; Chhattisgarh Kamdhenu Vishwavidyalaya, Anjora (India). College of Veterinary Science and Animal Health. Department of Veterinary Parasitology.. Bovine Nasal Granuloma in a non-descript Bullock.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.67-68  
KEYWORDS: NOSE. GRANULOMA. BULLOCKS. SCHISTOSOMA.

Nasal granuloma is caused by the blood fluke *Schistosoma nasalis* adversely affects the health and production of domestic livestock in various parts of India. The present report describes the occurrence of bovine nasal granuloma in a non-descript bullock from village Thanud of Durg (Chhattisgarh). Clinical examination revealed mucopurulent bloody nasal discharge, snoring sound and cauliflower like granuloma- tous growth in the nasal cavity. Microscopical examination of nasal discharges revealed boomerang-shaped eggs of *S.nasalis*. The bullock was treated with anthiomaline 20 ml deep i/m injection on three occasions at intervals of week. The bullock responded well and recovered completely after the 3'd injection.

325. Rangasamy, S.; Madras Veterinary College, Chennai (India). Department of Aniaml Reproduction, Gynaecology and Obstetrics. Sarath, T.; Madras Veterinary College, Chennai (India). Department of Aniaml Reproduction, Gynaecology and Obstetrics. Balasubramanian, S.; Madras Veterinary College, Chennai (India). Department of Aniaml Reproduction, Gynaecology and Obstetrics.. Clinical management of Multiple Vaginal Tear in Prepartum Vagino-Cervical Prolapse in a non-descript Buffalo.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.69-70  
KEYWORDS: VAGINAL DISEASES. WATER BUFFALOES.

A pluriparous non-descript buffalo at nine months of gestation was presented to Madras Veterinary College Teaching Hospital with history of continuous straining and frequent prolapse of vagina and cervix for the past five days. Under epidural anaesthesia, vaginal examination revealed blood clots and raw blood oozing out from the vaginal tear. Following surgical repair, the mass was reduced and repositioned. The animal had an uneventful recovery following treatment with antibiotic, anti-inflammatory and anti histamine for five consecutive days.

326. Jarora, V.; Guru Angad Dev Veterinary and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics. Singh, A.K.; Guru Angad Dev Veterinary and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics. Zodinsanga, V.; Guru Angad Dev Veterinary and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics. Singla, V.K.; Guru Angad Dev Veterinary and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics. Brar, P.S.; Guru Angad Dev Veterinary



and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics.Singh,T.; Guru Angad Dev Veterinary and Aniaml Sciences University, Ludhiana (India). College of Veterinary Science. Department of Veterinary Gynaecology and Obstetrics.. Fetal Arthrogryposis causing Dystociaina in a Mare.. Indian Veterinary Journal (India). (Jul 2015)v.92(7) p.74-75 KEYWORDS: DYSTOCIA. MARES. MANAGEMENT.

A rare case of dystocia in a mare due to fetal arthrogryposis and its successful management is described.

327. Madhav Mugale, N.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Balachandran, C.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Dillibabu, V.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Kirubharan,John; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Dhinkar Raj, G.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Sridhar, R.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology.Selvasubramaniam, S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Madras Veterinary College. Department of Veterinary Pathology. Hepatic Abscess in Sheep and Goat caused by O26 Escherichia Coli serotype An emerging pathogen. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.76-79 KEYWORDS: LIVER DISEASES. ABSCESSSES. SHEEP. GOATS. ESCHERICHIA COLI.

Liver abscess is a major economic problem in meat industry due to condemnation of edible part of carcass. In this study, an incidence 0.224% (56/25000) of hepatic abscess was recorded. Escherichia coli was isolated in highest number of cases which showed metallic sheen on eosin methylene blue agar in 12 cases (21.48%). Serotype O26 *E. coli* was identified and, recognized as an emerging pathogen. Other pathogens isolated were *Streptococcus spp.*, *Fusobacterium necrophorum*, *Staphylococcus spp.*, *Corynebacteria spp.* and *Pseudomonas spp.* Grossly, single to multiple and minute to large creamy-yellow coloured abscesses of varying sizes were found on both abscesses consisted of central areas of liquefactive necrosis surrounded by numerous polymorphonuclear neutrophils, few mononuclear cells, calcified centers and colonies of bacteria.

328. Maansi; GBPUAT, Pantnagar (India). College of Veterinary and Animal Sciences. Department of Veterinary Public Health and Epidmiology.Upadhyay, A.K.; GBPUAT, Pantnagar (India). College of Veterinary and Animal Sciences. Department of Veterinary Public Health and Epidmiology.. Antibiotic susceptibility of Smooth Brucella Abortus S99 and Rough Brucella Melitensis B115 Strains.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.80-81 KEYWORDS: BRUCELLA ABORTUS. ANTIBIOTICS. DISEASE CONTROL.

Brucellosis is an economically devastating and highly infectious zoonosis. The disease has attained a re-emerging and a wide range of domestic and wild animals are being involved. In humans, the disease ranges from a febrile illness to a more complicated form. The disease has been reported

globally with endemic pockets worldwide. Brucella organisms occur in smooth and rough forms. Virulence of smooth forms is more than the rough forms. The clinical isolates of Brucella are generally susceptible to the antibiotics but with the increase in drug resistance, the antibiotic susceptibility of the organisms is to be ensured for effective therapeutic results and to prevent relapse of the disease.

329. Konwar, B.; Central Agricultural University, Aizwal (India). College of Veterinary Sciences and Animal Husbandry. Department of Veterinary Surgery and Radiology. Saikia, B.; Central Agricultural University, Aizwal (India). College of Veterinary Sciences and Animal Husbandry. Department of Veterinary Surgery and Radiology. Bayan, H.; Central Agricultural University, Aizwal (India). College of Veterinary Sciences and Animal Husbandry. Department of Veterinary Surgery and Radiology. Survey of Foot Affections in Mizoram dairy animals. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.82-83 KEYWORDS: CATTLE. FEET. FOOT DISEASES. MOVEMENT DISORDERS.

Stall fed cattle were surveyed for lameness and the prevalence of clinical lameness was found to be 20.4% (204), out of which forelimb (50, 24.51 %) affection was significantly less than hind limb (154, 79.49%) and sole ulcer was recorded (68, 33.33%). Overgrowth of hoof was significantly more in lateral claws for hind limb (130, 84.42%) than medial claws for fore limb (38, 76%). Lactating cows in first four weeks after calving between 2-5 years of age were found to be most sensitive. Key words: Foot affections survey cattle.

330. Ponnusamy, P.; Veterinary College and Research Institute, Orathanadu (India). Department of Veterinary Microbiology. Chitra Ananda, M.; Veterinary College and Research Institute, Orathanadu (India). Department of Veterinary Microbiology. Kumar Ranjith, M.; Veterinary College and Research Institute, Orathanadu (India). Department of Veterinary Microbiology. Ramesh, A.; Veterinary College and Research Institute, Orathanadu (India). Department of Veterinary Microbiology. Infectious Bovine Corneal Ulceration associated with Methicillin resistant Staphylococcus Aureus in a dairy Cow : A case report. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.83-84 KEYWORDS: EYE DISEASES. ANTIBIOTICS. STAPHYLOCOCCUS AUREUS. COWS.

A 2 year old female Jersey cross bred dairy cattle was presented to the Teaching Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu, Thanjavur Dt, Tamilnadu with history of bilateral corneal ulceration, lymph node enlargement and bruxism. Samples were taken from affected eyes using a sterile swab for bacterial isolation and identification. Staphylococcus aureus was isolated and identified and it was found to be most sensitive to Tetracycline, Enrofloxacin, Gentamicin and Amikacin and resistant to penicillin, ampicillin and methicillin. Animal was treated with gentamicin systemically and locally and completely recovered with restoration of vision in 5 days of treatment duration.

331. Simon Shiju, M.; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical Complex. Gupta, Chhavi; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical Complex. Kumar Sasi, S.; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical Complex. Ramprabhu, R.; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical

Complex.Pazhanivel, N.; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical Complex.Prathaban, S.; Veterinary College and Research Institute, Tirunelveli (India). Teaching Veterinary Clinical Complex.. Plate-Rod technique for the management of Diaphyseal Humeral fracture in a Dog : A case report.. Indian Veterinary Journal (India). (Jul 2015) v.92(7) p.85-86 KEYWORDS: LIMB BONES. FRACTURE FIXATION. DOGS.

A three year old Chippiparai male dog was subjected to physical examination of humerus revealed pain, swelling and crepitus.Confirmative diagnosis of an unstable humeral diaphyseal fracture was made by radiographic evaluation. It was treated by open reduction and internal fixation accomplished using a 3.5mm dynamic compression plate applied over the tension surface of the bone and additional stability was provided by insertion of 3mm of intramedullary steinmann pin. Normal weight bearing was noticed on immediate post operative day and the animal recovered uneventfully gaining normal mobility.

332. Ramakrishnas, K.V.; Animal Disease Diagnostic Laboratory, West Godavari (India).Rao Sudersana, K.; Animal Disease Diagnostic Laboratory, West Godavari (India).Nageshbabu, M.; Animal Disease Diagnostic Laboratory, West Godavari (India).. Incidence of Ram Lamb mortalities in a commercial farm.. Indian Veterinary Journal (India).(Jul 2015) v.92(7) p.95-96 KEYWORDS: LAMBS. MORTALITY. FARM AREA. FARMS.

Containment of mortalities is key for successful commercial ram lamb farming. Incidence of mortalities in commercial farms fluctuates between 10-24% (Reddy and Choudhury 2000, Srinivasan et al., 2003). Factors like selection of lambs, stocking, live weight, adequacy of colostrum, maternal acquired immunity, deworming, mode of transportation, biosecurity, climate can influence lamb mortalities. An attempt was made to investigate into the etiopathogenesis of unusually high mortalities among ram lambs in a commercial farm.

333. Pal, Papri; ICAR, Gangtok (India). Research Complex for NEH Region.Sikkim Centre.Chatlod, L.R.; ICAR, Gangtok (India). Research Complex for NEH Region. Sikkim Centre.Bandyopadhyay, S.; ICAR, Gangtok (India). Research Complex for NEH Region. Sikkim Centre.Rahman, H.;ICAR, Gangtok (India). Research Complex for NEH Region. Sikkim Centre.Avasthe, R.K.; ICAR, Gangtok (India). Research Complex for NEH Region. Sikkim Centre.. Epidemiology of Nematodirus filicolis infection in goats in temperate humid zone of Sikkim.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.840-843 KEYWORDS: EPIDEMIOLOGY. NEMATODIRUS. INFECTION. GOATS. HUMID CLIMATE.

Out of 9,480 faecal sample examined, 1,622 (17.11 %) were positive with a eggs per gram of faeces (EPG) range of 100-700.Highest prevalence was observed in May (26.57%). Examination of small intestines of slaughtered goats (365) showed 12.39% incidence of N.filicolis infection with worm count in the range of 2.22 - 18.17. The female/male ratio was 0.153. The incidence was more prevalent in animals above 2 years of age (11.96%) followed by 1-2 year (9.38%) while those below 1 year of age showed only 3.45% prevalence.Moreover, the prevalence was more in spring (22.44%) and summer(21.07%) compared with autumn (15.47%) and winter (9.08%).

334. Ranjana, Haodijam; Manupur University, Imphal (India). Dept. of Life Sciences.

Parasitology Laboratory.Singh Gambhir, R.K.; Manupur University, Imphal (India). Dept. of Life Sciences. Parasitology Laboratory.. Gastrointestinal parasites associated with HIV infected Antiretroviral-Naive patients.. Journal of Interacademia (India). (Apr 2015) v19(2) p.216-223 KEYWORDS: DIGESTIVE SYSTEM. PARASITES. HUMAN IMMUNODEFICIENCY VIRUS. HIV INFECTIONS. ASCARIASIS.

Preserved faecal specimens (preserved in 10% buffer formalin and 2.5% potassium dichromate) from 209 HIV infected antiretroviral (ART)naive diarrhoeal patients aged between 10 to ~ 50 years were examined for the presence of geohelminth and protozoan parasites. 71(33.97%) patients were found to be infected for various parasites: *Ascaris lumbricoides* (15.49%), *Trichuris trichiura* (18.31 %), *Strongyloides stercoralis* (19.71), Hookworm (18.31%), *Taenia* sp, (5.63%), *Cryptosporidium* sp. (16.90%), *Isospora belli* (16.90%), *Entamoeba histolytica* (16.90%), *Giardia lamblia* (4.22%), and *Balantidium coli* (4.22%) respectively. Mixed infection was recorded in 32.39%, while single infection was recorded in 67.61 % respectively. The disease ascariasis was found to be independent of the age group (30-40) yrs [PO.OS) and (40-50) yrs [PO.OS), while the disease strongyloidiasis' and cryptosporidiosis were found to be independent of the age group (30-40) yrs [PO.OS). The disease isosporiasis was also found to be independent of the age group (40-50) yrs [PO.OS). In the present study, there is possibility of positive correlation (r) between the diseases ascariasis and strongyloidiasis (+0.31) and cryptosporidiosis and isosporiasis (+0.09). There is a moderate degree of positive correlation (r) between the diseases strongyloidiasis and trichuriasis (+0.74). In the present study, although more males (73.23%) were found to be infected than females(26.76%), there was no statistically significant sex differences.

335. Kumari, Shudha; BVC, Patna (India). Dept. of Veterinary Microbiology. Kumar, Rajesh; BVC, Patna (India). Dept. of Veterinary Surgery and Radiology.Kumari, Archana; BVC, Patna (India). Dept. of Veterinary Surgery and Radiology.Kumar, Pankaj; BVC, Patna (India). Dept. of Veterinary Parasitology.. Gross and histopathological study of artificially infected *Salmonella gallinarum* in poultry birds.Journal of Interacademia (India). (Apr 2015) v19(2) p.224-226 KEYWORDS: SALMONELLA GALLINARUM. EXPERIMENTAL INFECTION. POULTRY. BIRDS. KIDNEYS.

Fowl typhoid in poultry causes a high morbidity and mortality.Mortality ranging from 0 to 100 % Therefore prevent study done to early diagnosis of fowl typhoid and so that mortality can be prevented .For this study chicks were divided randomly in to two groups as infected' group and control at the age of 3 weeks. Infected groups were infected with *Salmonella gallinarum* inoculation intraperitoneally. Post-mortem examination of infected dead chicks showed gross pathological change in liver spleen kidney and heart.Histopathological change also observed in liver intestine, kidney spleen and heart. These changes help in diagnosis of fowl typhoid.

336. Jena, Basanti; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Animal Reproduction, Gynaecology and Obstetrics.Mohanty, D.N.; CVSc & AH,OUAT, Bhubaneswar (India). Dept. of Animal Reproduction, Gynaecology and Obstetrics.Das, S.; CVSc & AH, OUAT, Bhubaneswar (India). Dept.of Animal Reproduction, Gynaecology and Obstetrics.Das, D.; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Pathology.. Study on Uterine Microbial

characteristic in repeat breeding cows with Endometritis. Journal of Interacademia (India). (Apr 2015) v19(2) p.231-234 KEYWORDS: BACTERIA. BACTERIA. ESCHERICHIA COLI. STREPTOCOCCUS. ISOLATION TECHNIQUES. ENDOMETRITIS.

The present investigation was carried out to study the changes in uterine microbial environment in repeat breeding cows with endometritis. Ten repeat breeding cows suffering from endometritis as confirmed by alkaline pH of cervical mucus discharge and positive white slide test along with ten no. of normal cyclic cows were selected for the study. The mean bacterial load of cervical mucus discharge at estrous increased significantly in endometritic cows. *Escherichia coli* were the most common bacterial isolate followed by *Streptococcus spp.* and *Staphylococcus spp.*

337. Jena, Basanti; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Animal Reproduction, Gynaecology and Obstetrics. Mohanty, D.N.; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Animal Reproduction, Gynaecology and Obstetrics. Das, S.; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Animal Reproduction, Gynaecology and Obstetrics. Das, D.; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Pathology. Sahoo, G.R.; CVSc & AH, OUAT, Bhubaneswar (India). Dept. of Veterinary Biochemistry. Study on Haemo-Biochemical profile in Endometritic Cows. Journal of Interacademia (India). (Apr 2015) v19(2) p.235-239 KEYWORDS: ENDOMETRITIS. COWS. BLOOD. BIOCHEMISTRY.

The present investigation was carried out to study the changes in haematological and serum biochemical parameters in repeat breeding cows with endometritis. Ten repeat breeding cows suffering from endometritis as confirmed by alkaline pH of cervical mucus discharge and positive white side test along with ten no. of normal cyclic cows were selected for the study. The mean haemoglobin, total erythrocyte count, packed cell volume, lymphocyte and monocyte count as well as total protein and globulin level in serum decreased significantly in endometritic cows. The total leucocyte count, neutrophil count along with the enzymes AST, ALT, ACP and ALP increased significantly in endometritic cows compared to normal cows.

338. Das, Arvind Kumar; Bihar Veterinary College, Patna (India). Gautam, Avnish Kumar; Bihar Veterinary College, Patna (India). Kumar, Rajesh; Bihar Veterinary College, Patna (India). Dept. of Veterinary Surgery and Radiology. Singh, Manoj Kumar; Bihar Veterinary College, Patna (India). Mange infestations in Rabbits and its therapeutic amelioration. Journal of Interacademia (India). (Apr 2015) v19(2) p.240-242 KEYWORDS: MANGE. THERAPY. RABBITS.

A study was conducted on 1 to 2 years old New Zealand white rabbits have brought for the treatment suffering from severe dermatitis and alopecia at Teaching Veterinary Clinical Complex, Bihar Veterinary College, Patna. Detailed clinical examination revealed that, the skin was wrinkled and huge dry crust like formation was present on the facial region, upper part of the neck, ears, around the eyes and on nostril. The rabbits were treated with the three doses of subcutaneous injection of Ivermectin (Neomec) (Intas Pharmaceuticals Ltd.) 200 ug/kg body weight on 0 day, 7th day and 14th day from the first injection. Immunomodulator and nutritional supplement Proviboost drop (Petcare Animal Health Divn.) was also used 5 drops orally twice a day for 5 days as supportive therapy because animal was suffering from the anorexia. A skin lotion Kiskin

(Intas Pharmaceuticals Ltd.) was used for the topical application on the lesion for faster recovery in skin texture.

339. Roy, Rakesh; UBKV, Kalimpong (India). Darjeeling Krishi Vigyan Kendra. Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India).. Factors effecting level of knowledge about general symptoms of diseases among Goats owners in India.. Journal of Interacademia (India). (Apr 2015) v19(2) p.289-292  
KEYWORDS: GOATS. KNOWLEDGE MANAGEMENT. DISEASE CONTROL.

The study was taken up with the objective to find out the level of knowledge about general symptoms of diseases (GSD) among goat owners. The study was purposively conducted in West Bengal and Uttar Pradesh on the basis of high goat populated state in the country. In all, 180 respondents were randomly selected for the study. The study shows that majority had reported that reduced or no feed intake was an important GSD in goat followed by scratching and rubbing, abnormal discharge from natural orifices, emaciation and dullness, increased and difficult breathing. The study also reveals that mean knowledge level of the goat owners about GSD was medium but there was a significant difference in knowledge level between the two states. The study depicts that education, land holding, mass media exposure, formal interpersonal contact and social participation had significant and positive association with knowledge level about GSD. The study further revealed that education, flock size and mass media exposure were the main contributing factors to farmers' knowledge level about GSD.

340. Deshmukh, Priyanka; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Pharmacology and Toxicology. Sharma, R.K.. NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Pharmacology and Toxicology. Jain, Pankaj; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Surgery and Radiology. Kumar, Amit; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Animal Genetics and Breeding. Yadav, Alok Kumar; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Animal Genetics and Breeding. Sharma, Rahul; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Animal Nutrition. Shrivastav, Dharam Prakash; NDVSU, Jabalpur (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Pathology.. Metabolomics: A promising tool in Veterinary Diagnostics.. Journal of Interacademia (India). (Apr 2015) v19(2)p.320-331  
KEYWORDS: VETERINARY SERVICES. METABOLISM. DIAGNOSIS.

Metabolomics is an- emerging field of genomics research that focuses on high throughput characterization of small molecule metabolites in biological samples. The studies capture global biochemical events by assaying thousands of small molecules in cells, tissues, organs or biological fluids. This approach combines high-throughput sample analysis with computer-assisted multivariate pattern-recognition techniques. Metabolomic studies can lead to enhanced understanding of disease mechanisms as well as mechanisms for drug or xenobiotic effect and increased ability to predict individual variation in drug response phenotypes. Metabolites identified from these studies as diagnostic markers may be useful in clinical practice for the diagnosis, assessment of severity and response to therapy in a number of clinical disease states. It also has clinical impact in the field of oncology and adverse drug reactions. Metabolomics

has potential application to a wide range of fields, including functional genomics, integrative and systems biology, toxicology, clinical diagnostics, biomarker discovery for disease diagnosis and the drug discovery and development related studies.

341. Chaudhury, Swati; OUAT, Bhubaneswar (India), College of Veterinary Science & Animal Health. Dept. of Veterinary Pathology. Acharya, A.P.; OUAT, Bhubaneswar (India), College of Veterinary Science & Animal Health. Dept. of Veterinary Pathology. Maity, A.; OUAT, Bhubaneswar (India), College of Veterinary Science & Animal Health. Dept. of Veterinary Pathology. Das, D.; OUAT, Bhubaneswar (India), College of Veterinary Science & Animal Health. Dept. of Veterinary Pathology. Panda, S.K.; OUAT, Bhubaneswar (India), College of Veterinary Science & Animal Health. Dept. of Veterinary Pathology.. Haemato-Biochemical alterations in Theileria infected postpartum dairy Cows.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.26-29 KEYWORDS: EAST COAST FEVER. DAIRY COWS. PERINATAL PERIOD. BLOOD. BIOCHEMISTRY.

The clinicohaematobiochemical changes in postpartum dairy cows were studied. The animals showed clinical signs of pyrexia with anorexia, drop in milk yield, tachycardia, dyspnoea, anaemia, haemoglobinuria, brisket edema, enlargement of pre scapular and pre femoral lymph node. The Rb%, PCV%, TLC and TEC were distinctly lower than the normal value. The average values in MCV and MCR significantly increased indicating macrocytic hypochromic anaemia. There was increase in ALP, ALT and AST values. Total protein, albumin, globulin and A:G ratio were lower than the normal level. There was decrease in serum glucose, Ca and P value in infected cattle.

342. Rao, Mallikarjuna Ch.; College of Veterinary Science, Tirupati (India). Dept. of Surgery & Radiology. Kumar, Suresh R.V.; College of Veterinary Science, Tirupati (India). Dept. of Surgery & Radiology. Haragopal, V.; College of Veterinary Science, Tirupati (India). Dept. of Surgery & Radiology.. Pulse oxymetric and electrocardiographic studies during continuous infusion of propofol in Dogs.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.38-40 KEYWORDS: DOGS. HEART RATE. HEART. ECHOGRAPHY.

Pulse oximetry and ECG changes during continuous infusion of propofol after premedication with triflupromazine and diazepam were studied in 12 dogs of two groups. No significant changes were seen in SpO<sub>2</sub> values in both groups. None of the animals showed arrhythmias and conduction abnormalities in entire period of study.

343. Nayak, Sadananda; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Surgery and Radiology. Behera, Sidhartha Sankar; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Surgery and Radiology. Behera, Monalisa; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Surgery and Radiology. Pati, Saumyanjan; OUAT, Bhubaneswar (India). College of Veterinary Science and Animal Husbandry. Dept. of Veterinary Surgery and Radiology.. Torticollis in a Calf and its management.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.58-59 KEYWORDS: CALVES. NEUROMUSCULAR DISEASES. MANAGEMENT.

A two month old calf was presented with head tilt to one side. The case was diagnosed as torticollis condition. Both medicinal treatment and

physiotherapy protocol was followed. Nerve stimulant drug was administered for one week and one hand made cervical collar was applied to immobilize the neck in straight condition. On 15th day the neck could be moved about 70% of normal range and after one month the torticollis disappeared completely and the calf was able to walk and graze properly.

344. Gowri, B.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. of Veterinary Clinical Medicine. Ethics and Jurisprudence. Prathaban, S.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. of Veterinary Clinical Medicine. Ethics and Jurisprudence. Kathiresan, D.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. of Veterinary Clinical Medicine. Ethics and Jurisprudence. Srinivasan, S.R.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. of Veterinary Clinical Medicine. Ethics and Jurisprudence. Balachandran; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. of Veterinary Clinical Medicine. Ethics and Jurisprudence.. Impact of the fatty infiltration of liver in fertility in Cattle.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.60-61 KEYWORDS: FATTY LIVER. FERTILITY. IMPACT ASSESSMENT. CATTLE.

Fatty liver has both concurrent and latent negative effects on cows health and fertility. The study was undertaken to study the impact of fatty liver on fertility in cattle. Fertility parameters like interval from calving to first estrus or service (ICFS), interval from calving to conception (ICC), number of services, IGF-I and LH level at first service were taken for the study. Significant increase in number of days from calving to first service, calving to conception and number of services were observed in moderate and severe fatty infiltration of liver. A highly significant decrease in IGF-I and LH level at first service were observed in moderate and severe fatty infiltration of liver.

345. Chandrasekaran, D.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. Clinics. Thangapandiyan. M.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. Clinics. George, Ravi Sundar; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. Clinics. Enbavelan, P.A.; TANUVAS, Tamil Nadu (India). Madras Veterinary College. Dept. Clinics.. Sporadic cutaneous lymphoma in a Hallikar Bullock.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.62-63 KEYWORDS: LYMPHOMA. ABDOMEN. BULLOCKS.

The present communication puts on record a case of sporadic cutaneous lymphoma in a nine month Hallikar bullock on the lateral aspect of abdomen.

346. Dar, Mehraj-U-Din; Sher-e Kashmir University of Agricultural Sciences and Technology, Shuhama (India). Dept. of Veterinary Surgery and Radiology. Dar, Khadim Hussain; Sher-e Kashmir University of Agricultural Sciences and Technology, Shuhama (India). Dept. of Veterinary Surgery and Radiology. Dar, Shahid Hussain; Sher-e Kashmir University of Agricultural Sciences and Technology, Shuhama (India). Dept. of Veterinary Surgery and Radiology. Naikoo, Mehraj-Ud-Din; Sher-e Kashmir University of Agricultural Sciences and Technology, Shuhama (India). Dept. of Veterinary Surgery and Radiology. Unilateral Mastectomy for Fibrotic Udder and Moist Gangrenous lacerated teat in a Goat.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.63-65 KEYWORDS: MASTECTOMY. MAMMARY GLANDS. TEATS. GOATS.

A cross bred goat of 5 years age weighing 35 kg was presented with a



history of left teat laceration treated unsuccessfully by a local veterinarian. The affected teat had developed gangrene. Palpation revealed hard nodular consistency of the affected gland with no milk flow. Hence it was decided to undertake unilateral mastectomy. Surgery was performed under mild sedation using diazepam and local infiltration with 2% lignocaine HCL. Postoperatively ceftriaxone (0.5g, 1M, BID for 5 days) and meloxicam (2ml, 1M, OD for 3 days) were administered along with antiseptic dressing of suture line with (5%) povidone iodine solution. Skin sutures were removed on 12th day postoperatively.

347. Kashyap, Deepak Kumar; Arawali Veterinary College, Bajor (India). Teaching Veterinary Clinical Complex. Sahoo, Saraswat; Arawali Veterinary College, Bajor (India). Teaching Veterinary Clinical Complex. Giri, D.K.; Arawali Veterinary College, Bajor (India). Teaching Veterinary Clinical Complex.. Management of Extensive tongue laceration in a cross bred Bullock.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.67-68 KEYWORDS: TONGUE. CROSSBREDS. BULLOCKS. MANAGEMENT.

The present paper describes the case of tongue laceration in a cross bred bullock with the history of accidental injury of tongue. The clinical signs revealed anorexia, difficulty to chewed food and oral cavity showed lacerated tongue just closed to the frenulum linguae with bleeding. Other parameters under normal condition. On the basis of history and clinical signs the case was diagnosed as laceration of tongue and decided to perform radical surgery under Xylazine 0.1mg/kg, 1M. The animal was restrained and 7 ml of 2% Lignocaine Hydrochloride infiltrated locally around the lacerated area. Postoperatively, antibiotic and analgesic were given and advised for soft feed like dalia and gruel. Animal showed uneventful recovery.

348. Arulmozhi, A.; Veterinary College and Research Institute, Namakkal (India). Dept. of Veterinary Pathology. Dharmaceelan, S.; Veterinary College and Research Institute, Namakkal (India). Dept. of Veterinary Pathology. Balasubramaniam, G.A.; Veterinary College and Research Institute, Namakkal (India). Dept. of Veterinary Pathology. Madheswaran, R.; Veterinary College and Research Institute, Namakkal (India). Dept. of Veterinary Pathology.. Uterine leiomyoma in a young female Dog.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.69-70 KEYWORDS: UTERUS. ENDOMETRITIS. FEMALES. DOGS.

A seven-month-old female spitz dog was presented to Veterinary College and Research Institute Hospital for ovariohysterectomy in order to avoid breeding. During surgery, mild uterine enlargement with serosal congestion was noticed. Exploration of lumen of the uterine horns revealed blackish brown discoloration and endometrial thickening. Histopathology of the uterine horn tissue showed presence of spindle-shaped muscle fibers with centrally located nuclei running parallel in all directions and had typical appearance of uterine leiomyoma.

349. Balachandran, C.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Pazhanivel, N.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Jayaraman, K.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Parthiban, M.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Kumanan, K.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Sridhar, R.; Madras Veterinary

College, Chennai (India). Dept. of Veterinary Pathology. Manohar, Murali B.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology.. Co-occurrence of Marek's Disease and inclusion body Hepatitis in a broiler parent stock.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.78-80 KEYWORDS: BROILER CHICKENS. STOCKS. MAREK'S DISEASE. VIRUSES.

Seventeen-day-old broiler parent birds showed sudden death with a mortality rate of 10 per cent in a private farm. Based on the gross, histopathology and polymerase chain reaction performed with hexon gene of fowl adenovirus which revealed expected amplicon size of H1/H2 [1219 bp] and H3/H4 [1319 bp], it was diagnosed that the death of the birds was due to concurrent Marek's disease and inclusion body hepatitis.

350. Pandey, Anand Kumar; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Chaudhary, R.N.; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Singh, Gyan; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Jangir, T.C.; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Kumar, Sandeep; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Lather, Deepika; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Shrivastava, A.K.; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Kumar, Kailash; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex. Dahare, Divya; LUVAS, Hisar (India). College of Veterinary Sciences. Teaching Veterinary Clinical Complex.. Surgical management of Uterine Fibro-Leiomyoma with Pyometra in a Bitch.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.80-82 KEYWORDS: DOGS. FEMALES. OVARIES. UTERUS. PYOMETRA.

A Labrador bitch of 9 year old reported with the sign of purulent discharge from vagina furthermore, abdominal palpation revealed firm mass and the bitch was suspected for pyometra along with tumour. The bitch was treated with prostaglandins and antibiotics however, the bitch failed to respond the treatment. There- after, ovario-hysterectomy was performed and conformed that the bitch was suffering with cystic ovaries and pyometra along with uterine fibro-leiomyoma.

351. Velladurai, C.; Veterinary College and Research Institute, Namakkal (India). Dept. of Animal Reproduction Gynaecology & Obstetrics. Napoleon, Ezakial R.; Veterinary College and Research Institute, Namakkal (India). Dept. of Animal Reproduction Gynaecology & Obstetrics. Selvaraju, M.; Veterinary College and Research Institute, Namakkal (India). Dept. of Animal Reproduction Gynaecology & Obstetrics. Doraisamy, K.A.; Veterinary College and Research Institute, Namakkal (India). Dept. of Animal Reproduction Gynaecology & Obstetrics.. Pattern of induced oestrus and conception rate following ovsynch programme in retained fetal membranes affected and normally calved Cows.. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.84-86 KEYWORDS: OESTROUS CYCLE. REPRODUCTIVE PERFORMANCE. OVULATION. COWS.

Eight cows treated (Group I) for retained fetal membranes (RFM) and 8 normally calved (NC) cows (Group II) were selected at 35-50 days postpartum and were supplemented orally with TANUV AS mineral mixture daily 30-50 grams for 15 days. At the end of mineral mixture supplementation all the cows of both

the groups were treated with ovsynch protocol. Oestrus and ovulatory responses following ovsynch treatment in RFM affected and NC cows were 100 per cent. The mean interval to onset of induced oestrus in group I and II was  $49.04 \pm 3.17$  and  $47.97 \pm 2.65$  hours, respectively. The mean duration of induced oestrus was  $29.38 \pm 0.74$  and  $29.84 \pm 0.67$  hours in group I and II, respectively. The percentage of intense intensity was higher in group II (50.00) than group I (37.50 per cent). The first service, second service and overall conception rates were 25.00, 50.00 and 75.00 and 37.50, 50.00 and 87.50 per cent in group I and II, respectively. Hence it is concluded that mineral mixture plus ovsynch protocol improved the conception rate in RFM affected cows.

352. Jaikanth, C.M.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pharmacology & Toxicology. Venkateswaran, K.V.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pharmacology & Toxicology. Selvasubramanian, S.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pharmacology & Toxicology. Sesh, P.S.L.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pharmacology & Toxicology. Effect of extracts of *Crataeva religiosa* on Hepatic markers in liver intoxication. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.86-88 KEYWORDS: LIVER. RATS. LIVER DISEASES. POISONING.

The study was conducted to evaluate the hepatoprotective potentials of extracts of *Crataeva religiosa* in liver damaged rats and also to compare the efficacy of two extracts viz., aqueous and ethanolic extracts. Thirty six female Wistar rats used for the study were intoxicated on the first day of the study with an oral acute toxic dose of paracetamol at the rate of 3 g/kg b.w. Treatments were given from day 2 to day 8, with standard drug (silymarin at 100 mg/kg b.w.), test drug 1 at two doses (aqueous extract of *C. religiosa* at 200 and 400 mg/kg b.w.) and test drug 2 at two doses (ethanolic extract of *C. religiosa* at 200 and 400 mg/kg b.w.) respectively. Hepatic microsomal assays viz., lactate dehydrogenase (LDH) and gamma glutamyl transpeptidase (GGT) were carried out to test the efficacy of drugs. It was found that both the standard and test drugs were significant in restoring the elevated enzyme levels. It was further noticed that the ethanolic extract at 400 mg/kg b.w. had excelled as good as the standard drug, silymarin in restoring the elevated blood parameters.

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

353. Kumar, Vijay; National Dairy Research Institute, Karnal (India). Chakravarty, A.K.; National Dairy Research Institute, Karnal (India). Genetic disorders in dairy cattle : An Indian perspective. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.819-827 KEYWORDS: GENETIC DISORDERS. DAIRY CATTLE. INDIA.

Genetic diseases have always been present in the animal population but their significance has increased in recent decades. In some breeds, the occurrence of inherited anomalies has become frequent and economically important. Some of autosomal recessive disorders are Holstein specific. The present review article describes prevalence of the most important autosomal recessive disorders in Holstein and its crossbreds as compared to their occurrence worldwide. Mainly five disorders namely, bovine leukocyte adhesion deficiency (BLAD), deficiency of uridine monophosphate synthase (DUMPS), bovine citrullinaemia, complex vertebral malformation (CVM) and factor XI (FXI) deficiency syndrome, are being screened in Indian Holstein and its crossbred

cattle with the major objective to reduce the incidence of genetic disorders in cattle population and reduce the economic losses to the organized farms. Detection of heterozygote carriers enables their selection, and therefore, the control and prevention of the spread of recessive diseases in the population.

354. Mohapatra, A.K.; CVSc & AH, O.U.A.T., Odissa (India). Dept. of Veterinary Pathology. Das, D.; CVSc & AH, O.U.A.T., Odissa (India). Dept. of Veterinary Pathology. Jena, B.; CVSc & AH, O.U.A.T., Odissa (India). Dept. of Agro. Panda, S.K.; CVSc & AH, O.U.A.T., Odissa (India). Dept. of Veterinary Pathology. Mohanty, D.N.; CVSc & AH, O.U.A.T., Odissa (India). Dept. of Agro.. Incidence of various reproductive disorders in Canines in and around Bhubaneswar. Journal of Interacademia (India). (Apr 2015) v19(2) p.227-230 KEYWORDS: REPRODUCTIVE DISORDERS. DOGS. PYOMETRA.

The current study was undertaken to study the incidence of various reproductive disorders in canines in and around Bhubaneswar. Among various reproductive diseases in dogs, pyometra showed highest incidence of 41.66% followed by transmissible venereal tumour (21.15%), mammary tumour (17.95%), abortion (8.97%), ovarian cysts (2.56%), vaginal hyperplasia (1.28%), cervical tumour (0.64%), testicular. tumour (3.2%) and cryptorchidism (2.56%). Obtaining knowledge regarding various reproductive disorders is essential to adopt preventive measures and for developing therapeutic measures for controlling the most prevalent reproductive disorders in canines.

355. Ekambaram, B; Sri Venkateswara Veterinary University, Palamaner (India). Livestock Research Station. Network Project on Sheep Improvement. Rajesh, M.M.; Sri Venkateswara Veterinary University, Palamaner (India). Livestock Research Station. Network Project on Sheep Improvement. Kumar, Vijay C.; Sri Venkateswara Veterinary University, Palamaner (India). Livestock Research Station. Network Project on Sheep Improvement.. Pre-weaning mortality pattern of Nellore lambs in an organized farm.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.1-3 KEYWORDS: PREWEANING PERIOD. LAMBS. MORTALITY.

The information on pre-weaning lamb mortality of Nellore Sheep was calculated from the available records and analyzed on the basis of season, month, sex and type of body system involved in diseased conditions. The results indicated that during the study period 1752 births and 110 deaths were noticed. Majority of the lambs were died during winter season (59.1%) followed by summer season (30.9%). Respiratory system (37.27%) and Digestive system (31.82%) related diseases were the main reasons of lamb mortality.

356. Kumar, V.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Kemalatha, S.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Balachandran, C.; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Rao, Ganne Venkata Sudhakar; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Jayaprakash, R; Madras Veterinary College, Chennai (India). Dept. of Veterinary Pathology. Prognostic significance of mitotic index in Canine Cutaneous Tumours. Indian Veterinary Journal (India). (Sep 2015) v92(09) p.14-16 KEYWORDS: DOGS. DISEASE CONTROL. CARCINOMA.

The present work was undertaken to apply mitotic index as an indicator in the prognosis of cutaneous tumours in dogs. Out of the 103 samples

collected from the Madras Veterinary College, Teaching Hospital, Chennai, mitotic index was analyzed by light microscopy on formalin fixed paraffin embedded section of selected 53 canine cutaneous tumours. Mitosis was noticed in all the type of tumours. But the mitotic figures were more in all the malignant tumours when compared to the benign tumours. Among the malignant tumours, metastasis and death rate was higher.

#### **M01 Fisheries and aquaculture - General aspects**

357. Infantina Amali, J.; Fisheries College and Research Institute, Thoothukudi (India). Department of Fisheries Economics. Jayaraman, R.; Fisheries College and Research Institute, Thoothukudi (India). Department of Fisheries Economics.. Constraint analysis of problems of fishermen in motorized fishing sector in Ramanathapuram district of Tamil Nadu.. Indian Veterinary Journal (India). (Jul 2015) v.92(7)p.87-89 KEYWORDS: CONSTRAINTS. STATISTICAL METHODS. FISHERMEN. TAMIL NADU.

Indian fisheries sector plays a crucial role in the socio-economic development of the country through its consistent contribution to the GDP employment, export earnings nutritional and livelihood. The increased efforts in fish production led to the stagnation of catch forcing the government to intervene and impart management measures for the sustenance of the marine resources. Though notable increase in production from the marine sector was achieved with the implementation of these management measures, nevertheless, it has had significant impact on the social and economic wellbeing of the fishermen over the years. The aim of this study is to understand the constraints of fishermen operating motorized crafts; both owners and labourers and reasons for indebtedness in Ramanathapuram district, Tamil Nadu.

358. Mallik, Sumata Kumar; ICAR-Directorate of Coldwater Fisheries Research, Bhimtal (India). Sarma, Debajit; ICAR-Directorate of Coldwater Fisheries Research, Bhimtal (India). Sarma, Dandadhar; Gauhati University, Gauhati (India). Dept. of Zoology. Shahi, Neetu; ICAR-Directorate of Coldwater Fisheries Research, Bhimtal (India). Acid mine drainage, a potential threat to fish fauna of Simsang river, Meghalaya.. Current Science (India). (25 Aug 2015) v109(4)p.687-690 KEYWORDS: ACIDS. DRAINAGE. FISH. RIVER FISHERIES.

359. Madhu, V.R.; Central Institute of Fisheries Technology, Cochin (India). Remesan, M.P.; Central Institute of Fisheries Technology, Cochin (India). Pravin, P.; Central Institute of Fisheries Technology, Cochin (India). Boopendranath, M.R.; Central Institute of Fisheries Technology, Cochin (India). Performance of separator trawl off Cochin, southwest coast of India. Fishery Technology (India). (Jul 2015) v52(3) p.145-151 KEYWORDS: TRAWLERS. PRAWNS AND SHRIMPS. AURELIA AURITA.

Shrimp trawling generates large quantities of bycatch due to the non-selective nature of the gear. Behavioural differences and vertical distribution of the targeted species are among the main factors considered for designing trawls for selective trawling. This study attempts vertical separation of species in a trawl by inserting a horizontal panel, leading the upper and lower compartments to two separate codends. A total of 27 hauls were carried out and the species assemblage in the upper and lower codends were studied. Multivariate analysis was carried out to find the differences in the species

assemblage structure between the two codends. Comparative analysis of the catches in the two codends has shown that the catch rate was about 25 times higher in the lower cod end than in the upper codend. The catch rate of *Parapenaeopsis stylifera* and *Metapenaeus dobsoni* alone formed around 77% of the total CPUE in the lower codend. The contribution of shrimps in the upper codend was only about 15% of the total CPUE, which confirmed the importance of vertical height of the trawl mouth in the selective capture of fishes and for reducing by catch, which comprised mostly of juveniles of commercially important fishes, in targeted shrimp trawling. Although the diversity indices did not show any significant difference between the codends, the difference in the species were very significant in the ANOSIM test (p<0.01) and the major species that were responsible for the difference in the species assemblages were found to be *P. stylifera* and *Sardinella longiceps*. As the catch of jellyfish were significantly lower in the lower codend, their catch in shrimp trawls can be considerably reduced by using nets with low vertical height.

360. Dineshbabu, A.P.; Central Marine Fisheries Research Institute, Mangalore (India). Research Centre Mangalore. Thomas, Sujitha; Central Marine Fisheries Research Institute, Mangalore (India). Research Centre Mangalore. Dinesh, A.C; Geological Survey of India, Mangalore (India). Marine Wing.. GIS for assessing spatio-temporal variations in Trawl bycatch off Mangalore coast.. Fishery Technology (India). (Jul 2015) v52(3) p.152-156 KEYWORDS: GEOGRAPHICAL INFORMATION SYSTEMS. TRAWLERS. BYCATCH. COASTS.

In India, trawl is the major gear contributing more than 50% of the marine fish landing and during 2008-2011, the average landing along the Indian coast was estimated at 1.7 million t. In India, fish brought from trawl fishery for human consumption in fresh or processed form is termed as commercial landing and the rest is called low valued bycatch (LVB). The increased demand for LVB from fish meal plants is an emerging threat for marine fish production in the future, since LVB was constituted mainly by juveniles of commercial fishes. The study showed that the percentage of LVB from the trawlers in India increased from 21 % in 2008 to 23% in 2011. The results of the study identify some of the fishing grounds and seasons, in which the percentage of juvenile bycatch of the commercial species is very high. Implementing operational restrictions in the fishery in such areas will help in reviving the stock. The paper illustrates the utility of the spatio temporal data in suggesting seasonal and spatial restrictions in fishing operations in tropical multispecies scenario.

361. Sajeevan, M.K.; Fishery Survey of India, Mumbai (India). Botawala Chambers. Kurup, Madhusoodana B.; Kerala University of Fisheries and Ocean Studies, Cochin (India).. Length-weight relationship and condition factor of *Cobia*, *Rachycentron canadum* (Linnaeus, 1766) along northwest coast of India.. Fishery Technology (India). (Jul 2015) v52(3) p.184-186 KEYWORDS: LENGTH. WEIGHT. RELATIONSHIP SCHEME. FISH. RACHYCENTRON CANADUM. COASTS. INDIA.
362. Vipin, P.M.; Central Institute of Fisheries Technology, Cochin (India). Ravi, Renju; Central Institute of Fisheries Technology, Cochin (India). Pradeep, K.; Central Institute of Fisheries Technology, Cochin (India). Fernandez, Jose T.; Central Institute of Fisheries Technology, Cochin (India). Madhu, V.R.; Central Institute of Fisheries Technology, Cochin (India). Remesan, M.P.; Central Institute of Fisheries Technology, Cochin (India). Boopendranath, M.R.; Central Institute of Fisheries

Technology, Cochin (India).Length-weight relationship of *Myctophum spinosum* (Steindachner, 1867) caught off south-west coast of India.. Fishery Technology (India).(Jul 2015) v52(3) p.187-190 KEYWORDS: LENGTH. WEIGHT. RELATIONSHIP SCHEME. MYCTOPHUM PUNCTATUM. INDIA.

#### **M11 Fisheries production**

363. Shashidhar, K.; Central Institute of Fisheries Technology, Cochin (India).Biji, K.B.; Central Institute of Fisheries Technology, Cochin (India).Ravishankar, C.N.; Central Institute of Fisheries Technology,Cochin (India).Gopal, Srinivasa T.K.; Central Institute of Fisheries Technology, Cochin (India).Joseph, Jose; Central Institute of Fisheries Technology, Cochin (India). Development of ready to drink iron fortified shrimp soup in retortable pouches.. Fishery Technology (India). (Jul 2015) v52(3) p.157-163 KEYWORDS: IRON. PRAWNS AND SHRIMPS. SOUPS.

Soup prepared from Indian white shrimp (*Fenneropenaeus indicus*) was fortified with iron (0.024%) by incorporating sodium iron EDTA.The soup was thermal processed at  $F_0$  6.0, at three different temperatures viz., 110, 115 and 121.JOC in retortable pouches. All the samples were found to be commercially sterile. Iron fortification did not show any significant difference in sensory acceptance of the product after thermal processing at different temperatures. A higher  $b^*$  value was observed in fortified soup compared to that of control soup. Thermally processed fortified shrimp soup was in acceptable condition even after 90 days at ambient temperature with slightly higher sensory scores for the product processed at 121.1°C.

364. Ajeeshkumar, K.K.; Central Institute of Fisheries Technology, Cochin (India).Vishnu, K.V.; Central Institute of Fisheries Technology, Cochin (India).Kumari, Remya K.R.; Central Institute of Fisheries Technology, Cochin (India).Navaneethan, R.; Central Institute of Fisheries Technology, Cochin (India).Asha, K.K.; Central Institute of Fisheries Technology, Cochin (India).Ganesan, B.; Central Institute of Fisheries Technology, Cochin (India).Niladri, S.C.; Central Institute of Fisheries Technology, Cochin (India).Anandan, R.;Central Institute of Fisheries Technology, Cochin (India).Suseela,M.. Central Institute of Fisheries Technology, Cochin (India).Biochemical composition and heavy metal content of selected marine fish from the Gulf of Mannar, India.. Fishery Technology (India). (Jul 2015) v52(3) p.164-169 KEYWORDS: BIOCHEMISTRY. HEAVY METALS. SALTWATER FISHES. INDIA.

Biochemical composition of five marine fish; grey bamboo shark, yellow margin triggerfish, pale- edged stingray, laced moray and Japanese leatherjacket fish from the Gulf of Mannar, India were evaluated. Moisture, protein, lipid and ash content for the samples ranged between 75.07-76.74, 17.99-20.97, 1-3.5 and 1.46-1.93%respectively. Profiles of heavy metal, fatty acid and amino acid data were also collected. The predominant fatty acids recorded in all five species were docosahexaenoic acid (DHA), arachidonic acid(AA) and palmitic acid. All five species contain high content of different essential and non-essential amino acids namely glutamic acid, aspartic acid, arginine, serine and lysine. Significant amount of iron (13-50 ppm), zinc (2.5-10.5 ppm) and copper (0.18-4.03 ppm) were found in all the fishes. Among heavy metals, cadmium (0.05-0.1ppm) was detected which is below permissible limit.

## M12 Aquaculture production and management

365. Deepthi, A.; Sri Venkateswara Veterinary University, Mithukur (India). College of Fishery Sciences. Dept. of Fisheries Extension. Babu, Yarrakula Mahesh; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Faculty of Fishery Sciences. Dept. of Fishery Extension. Dana, S.S.; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Faculty of Fishery Sciences. Dept. of Fishery Extension.. Fishing ban and its impact on Fisheries management in Thoothukudi district.. Journal of Interacademia(India). (Apr 2015) v19(2) p.312-319 KEYWORDS: FISHERMEN. IMPACT ASSESSMENT. FISHING OPERATIONS.

Fishery is an important sector in India and it provides employment to millions of people and contributes to food security of the country. It is widely accepted that the depletion of fish stock is due to introduction of trawler techniques, which scrape the bottom of the sea and end up catching juvenile fish. In this context, state government has imposed fishing ban for a specific period in order to allow the fish to spawn and replenish its species. Blanket ban on fishing during specific period in a year is one of the most common practiced techniques to sustain the fishery resources. This study is conducted to find out the threats to sustainability of marine resources due to fish ban. A group of 90 fishermen were selected from Thoothukudi North and Thoothukudi South using random sampling technique. Data were collected through structured interview schedule. The findings of the study revealed that 96.67 percent of the fishermen agreed that fishing ban helps in recruitment of fish stocks, breeding ground protection (90.56%), protects juvenile fish (81.11%), maintaining of fish population (76.67%), protection of sea bottom, coral reefs and grass bed (72.22%), reduce over exploitation of fish stocks (67.78%) and conservation of fishery resources (43.33%).

366. Hassan, Femeena; Central Institute of Fisheries Technology, Cochin (India). Gracious, Treesa; Central Institute of Fisheries Technology, Cochin (India). Geethalakshmi, V.; Central Institute of Fisheries Technology, Cochin (India). Sanjeev, S.; Central Institute of Fisheries Technology, Cochin (India).. Post-harvest bacterial quality of *Lethrinus lentjan* (Lacepede, 1802).. Fishery Technology (India). (Jul 2015) v52(3) p.170-176 KEYWORDS: POSTHARVEST PHYSIOLOGY. LETHRINUS LENTJAN. BACTERIA. FOOD SAFETY.

Food safety and microbiological quality particularly in high moisture foods like seafood have gained significant attention among consumers. Compromise with regard to quality standards for the retail trade of fish and fish products is decreasing the quality of fish. Present study was conducted to detect the bacterial progression of fish from harbour to retail shop and market. *Lethrinus lentjan* (white snapper) was collected from three different strategic locations, viz., harbour, retail shop and market on the same day and quantitative and qualitative bacteriological analyses were carried out. Samples collected from market exhibited 12.61% more mesophilic count than that of harbour samples and 9.5% more than retail samples. The increasing trend in bacterial counts was noticed in psychrophiles, enterobacteriaceae, faecal streptococci, hydrogen sulphide producers, *Brochothrix thermosphacta* and histamine producing bacteria. Pathogens like *Salmonella*, *Vibrio cholerae*, *V. parahaemolyticus* and *Listeria monocytogenes* were absent in the analysed samples.



367. Abirami, P.; Annamalai University, Parangipettai (India). CAS in Marine Biology. Giji, S.; Annamalai University, Parangipettai (India). CAS in Marine Biology. Mohan, K.; Annamalai University, Parangipettai (India). CAS in Marine Biology. Arumugam, M.; Annamalai University, Parangipettai (India). CAS in Marine Biology. Proximate composition, amino acid profile and mineral content of Beach Clam (*Donax cuneatus*). *Fishery Technology (India)*. (Jul 2015) v52(3) p.191-193 KEYWORDS: AMINO ACIDS. MINERALS. DONAX CUNEATUS.
368. Das, Sanjoy; Central Institute of Fisheries Technology, Cochin (India). Fernandez, Jose T.; Central Institute of Fisheries Technology, Cochin (India). Lalitha, K.V.; Central Institute of Fisheries Technology, Cochin (India). Microbiological quality of Myctophid fish of the Arabian sea. *Fishery Technology (India)*. (Jul 2015) v52(3) p.194-197 KEYWORDS: MICROBIOLOGY. QUALITY. MYCTOPHIDAE. FISH. ARABIAN SEA.

#### **M40 Aquatic ecology**

369. Visnuvinayagam, S.; Central Institute of Fisheries Technology, Navi Mumbai (India). Mumbai Research Centre. Viji, P.; Central Institute of Fisheries Technology, Navi Mumbai (India). Mumbai Research Centre. Binsi, P.K.; Central Institute of Fisheries Technology, Cochin (India). Chakrabarti, R.; Central Institute of Fisheries Technology, Navi Mumbai (India). Mumbai Research Centre. Adiga, Thriveni; Central Institute of Fisheries Technology, Navi Mumbai (India). Mumbai Research Centre. Joshy, C.G.; Central Institute of Fisheries Technology, Cochin (India). Lalitha, K.V.; Central Institute of Fisheries Technology, Cochin (India).. Effect of monsoon on sulphite reducing clostridia levels in fish from retail outlets in Maharashtra. *Fishery Technology (India)*. (Jul 2015) v52(3) p.198-201 KEYWORDS: MONSOON CLIMATE. SULPHITES. CLOSTRIDIUM. FISH. MAHARASHTRA.

#### **Q02 Food processing and preservation**

370. Pugazhenthii, T.R.; Madras Veterinary College, Chennai (India). Department of Dairy Science. Dhanalakshmi, B.; Madras Veterinary College, Chennai (India). Department of Dairy Science. Elango, A.; Madras Veterinary College, Chennai (India). Department of Dairy Science. Bharathidhasan; Madras Veterinary College, Chennai (India). Department of Dairy Science.. Prevalence of Moulds in Cheese and Screening for Mycotoxigenic *Penicillium Citrinum*. *Indian Veterinary Journal (India)*. (Jul 2015) v.92(7) p.13-16 KEYWORDS: MOULDS. CHEESE. PENICILLIUM. TOXICOLOGY.

On analysis of eight samples each of Cheddar, processed, Roquefort and Swiss cheese collected aseptically from organized and private dairies for the prevalence of moulds, 87 moulds were isolated from cheese, of which *Penicillium* sp. was found to be the highest (66.76%) with the highest incidence of *Penicillium citrinum* (36 isolates). The mean yeast and mould count was highest in Roquefort cheese ( $3.68 \times 10^3$ ) and lowest in processed cheese ( $6.1 \times 10^2$ ). Out of 36 isolates of *P. citrinum* isolated, 12 were capable of producing citrinin in Yeast Extract Sucrose broth (33.33%) and 5 in cheese (13.89%) and all were toxic to chick embryo (33.33%) at the concentration of 0.025 ug per egg.

## **U10 Mathematical and statistical methods**

371. Akhtar, F.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Animal Genetics and Breeding. Aziz, A.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Animal Genetics and Breeding. Goswami, R.N.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Animal Genetics and Breeding. Zaman, G.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Animal Genetics and Breeding. Path coefficient analysis of first lactation milk yield in Frieswal Cows of Assam.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.102-104  
KEYWORDS: LACTATION. MILK YIELD. COWS. ANALYTICAL METHODS. ASSAM.

Records of 729 Frieswal cows of Assam were utilized for the present study. The correlations of the FLMY with AFC, FLL, FDP and FCI were partitioned into direct and indirect effects. The numerical values of the coefficients assigned to each of the path showed maximum direct effect of FLL (0.645) on FLMY followed by that of Fel (0.548). The direct effects of AFC and FDP were found to be low (0.034 and - 0.132 respectively). The FLL had maximum total effects (0.662) on FLMY followed by FCI (0.238).

372. Kumar, Arvind; Indian Agricultural Statistics Research Institute, PUSA, New Delhi (India) Varghese, Cini; Indian Agricultural Statistics Research Institute, PUSA, New Delhi (India) Varghese, Eldho; Indian Agricultural Statistics Research Institute, PUSA, New Delhi (India) Jaggi, Seema; Indian Agricultural Statistics Research Institute, PUSA, New Delhi (India). Irregular Sudoku-type designs for animal experiments.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1046-1050  
KEYWORDS: EFFICIENCY. STATISTICAL METHODS. VARIANTS.

In experiments involving animals, it may be a difficult task for the experimenter to get homogeneous groups of animals. Blocking is commonly practiced to eliminate variability present in experimental material due to some known sources such as age, breed, housing condition, initial body weight, litter size, etc. When there are two non-interacting sources of variation in the experimental material, experimental designs under two-way blocking structure are advised. However, these designs are not appropriate when a third source of variability is present in the experimental material as they may not be able to mark out the third features that tend to clump the animals into a third set of compact groups. Many times the clumps may be irregular, having no uniformity. In this paper, four methods of constructing designs under three way blocking structure for irregular clumps were developed in which two methods give designs with clumps having empty nodes. These designs assure more precise comparison among the treatments under study by removing three known sources of variability present in the experimental material.

## **U30 Research methods**

373. Das, Mukut; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Mili, D.C.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Roychoudhury, R.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Gogoi, A.K.; Assam Agricultural

University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Borah, M.C.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Boroghain, A.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management. Saikia, B.N.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Livestock Production and Management.. Managemental practices adopted by the rural dairy farmers in lower Brahmaputra Valley. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.62-66 KEYWORDS: DAIRY CATTLE. MANAGEMENT. FARMERS. ASSAM.

An investigation was carried out to study the managemental practices adopted by the rural dairy farmers of Kamrup, Nalbari, Barpeta and Goalpara district of Assam in rearing indigenous and crossbred cows. The majority of dairy farmers used thatch as roofing material in their cattle shed (56.84% and 81.48% in crossbred and indigenous cows Managemental practices adopted by dairy farmers respectively). Majority cattle sheds were observed with half wall (47.95%) for crossbred cows and full wall (62.96%) for indigenous cows. Concrete floor and earthen floor cattle shed were observed for crossbred cows as 67.81 per cent and 90.74 per cent for indigenous cows respectively. Proper drainage facilities in the sheds for crossbred cows (65.75%) and without proper drainage facilities for indigenous cows (88.89%) were also observed. Stall feeding was observed as 58.22 per cent in crossbred cows while grazing was observed as 92.59 per cent in indigenous cows. Most of the farmers fed their cows with naturally grown green fodder (94.52 and 96.30% in crossbred and indigenous cows respectively). The main source of dry fodder was paddy straw (*Oryza sativa* L.) and fed to the animals 2-5kg per milch animal per day. Concentrate ration was provided 3-7 kg per crossbred cow per day; while for indigenous cows, 62.96 per cent of dairy farmers offered only rice polish 1-3 kg per cow per day and 37.04 per cent of dairy farmers did not provide concentrate ration to their cows at all.

374. Hazarika, Rupjyoti; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Poultry Science. Kalita, K.P.; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Poultry Science. Saikia, Nitul; Assam Agricultural University, Khanapara (India). College of Veterinary Science. Dept. of Poultry Science.. Economics of broiler farming in Lakhimpur and Sonitpur districts of Assam.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.66-68 KEYWORDS: BROILER CHICKENS. FARMING SYSTEMS. MANAGEMENT. INCOME.

A study on management practices and economics of broiler farming was conducted in two districts of Assam, viz. Lakhimpur and Sonitpur. The data were collected from 100 numbers of respondents by a pre-tested interview schedule. The result showed that majority of the respondents in both districts reared broilers on semi-pucca (low cost poultry house constructed with locally available materials having cemented floor) house on deep litter system did not maintain proper farm records. Feed was the major operating cost in both the district. The cost of production and income per batch of broiler was significantly (P < 0.01) higher in Sonitpur as compared to Lakhimpur district, which might be due to the higher flock size of broilers in Sonitpur as compared to Lakhimpur. However, the income per broiler was non-significant

(Pe&rdquo;O.OS). It could be concluded that broiler farming in Sonitpur district is better in terms of farm infrastructure and flock size leading to higher returns in comparison to Lakhimpur district.

375. Khekare, M.M.; Mahatma Phule Krishi Vidyapeeth, Rahuri (India). Dept.of Animal Husbandry and Dairy Science.Bhoite, U.Y.; Mahatma Phule Krishi Vidyapeeth, Rahuri (India). Dept. of Animal Husbandry and Dairy Science.. Production performance of Phule Triveni Cows.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.69-72 KEYWORDS: COWS. LACTATION. MILK. YIELDS.

The data on production performance of 1398 records of Phule Triveni cows maintained at Research Cum Development Project on Cattle, Rahuri were utilized for study. The least squares means of lactation milk yield (LMY), 300 days milk yield (300DMY), lactation 'length (LL) and dry period (DP) were worked out. The overall mean LMY, 300DMY, LL and DP in Phule Triveni were  $3112.15 \pm 25.79$  kg,  $2883.69 \pm 20.48$  kg,  $336.47 \pm 1.74$  days and  $82.34 \pm 2.16$  days respectively. The period of calving had significant (P0.01) effect on all the traits under study. The season of calving had non-significant influence on all the traits. The lactation order had significant (P0.01) influence on LMY and 300 DMY. The phenotypic and genetic correlations of LMY with 300DMY and LL and between 300DMY and LL were positive and significant.

376. Fanai, R.; Central Agricultural University, Mizoram (India). College of Veterinary Science. Dept. of Livestock Production & Management.Hmar, L.; Central Agricultural University, Mizoram (India). College of Veterinary Science. Dept. of Livestock Production & Management.Kalita, G.; Central Agricultural University, Mizoram (India). College of Veterinary Science. Dept. of Livestock Production & Management.Samanta, A.K.; Central Agricultural University, Mizoram (India).College of Veterinary Science. Dept. of Animal Nutrition.Khate, K.;Central Agricultural University, Mizoram (India). College of Veterinary Science. Dept. of Livestock Production &Technology.Economics of broiler rearing under intensive and backyard system of management in Mizoram.. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.104-106 KEYWORDS: BROILER CHICKENS. ANIMAL HOUSING. MANAGEMENT. MIZORAM.

Rearing of commercial broilers up to 3-4 months of age till they attain 4-5 kg body weight is common in backyard system in Mizoram.The study was conducted to compare the performance of broiler under Intensive and Backyard System of management, for which 300 commercial broilers were reared in three replicates (100 birds in one replicate) under Intensive System in the College farm and another 300 birds were reared at farmers level under Backyard System in 10 replicates (30birds / farmers). Cost of production/kg broiler was Significantly lower in intensive system (Rs.54.15 and Rs.63.26) compared to backyard system (Rs. 65.05 and Rs. 106.49) system of rearing both at the end of 6th and 13th week of age. It was observed that the gross margin in broiler rearing up 6 weeks of age was quite satisfactory in both intensive and backyard system, however rearing of broiler up to 13th weeks of age reduced the margin, especially under backyard system rearing in state of Mizoram, which might be due to poor growth, higher feed consumption and because of higher mortality rate as compared to intensive system of rearing.

#### U40 Surveying methods

377. Sone, Poornima; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Bardhan, D.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Kumar, Avadhesh; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India).. Role of goats in livelihood of rural poor in Uttarakhand hills : An analysis based with special reference to multivariate typology of households based on farm and socio-economic characteristics,. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.913-919 KEYWORDS: STATISTICAL METHODS. RUMINANTS. GOATS. FARMS.

The present study was conducted on a sample of 100 goat farmers randomly drawn from 2 administrative blocks in Almora, Uttarakhand to analyze the role of goats in the livelihoods of rural households. Farm household typologies were constructed by using 2 multivariate statistical techniques, viz. principal component analysis (PCA) and cluster analysis (CA). PCA was used to transform linearly an original set of 17 variables, representing farm and socioeconomic characteristics, into a smaller set of uncorrelated variables (factors) that represents most of the information in the original set. The factors retained from the PCA were used for cluster analysis. Five homogenous groups (clusters) were obtained. Cluster 1 (20%) was identified as households with high farm family labour involvement and low female labour involvement in goat husbandry, Cluster 2 (21 %) as households with high income from agriculture and dairying, Cluster 3 (18%) as households with low income from agriculture and dairying, Cluster 4 (22%) as households with high farm family labour involvement and high female labour involvement in goat husbandry and Cluster 5 (19%) as female headed households. Contribution of income from goat in animal husbandry income, farm income and household's total income for all clusters combined was 61.45, 14.23 and 7.01 %, respectively. Share of income from goat was highest for cluster 3, implying that small ruminants like goats are most important for livelihood security of resource poor farmers. Hence, any improvement in goat production enhances the socio-economic status of the farmers, specially the rural poor.

378. Singh, Mohan Das N.; ICAR- Indian Agricultural Statistics Research Institute, New Delhi (India). Paul, A.K.; ICAR- Indian Agricultural Statistics Research Institute, New Delhi (India). Paul, Ranjit Kumar; ICAR- Indian Agricultural Statistics Research Institute, New Delhi (India).. Selecting appropriate nonlinear growth models using Bootstrap technique.. Indian Journal of Animal Sciences (India). (Aug 2015) v.85(8) p.920-922 KEYWORDS: GROWTH. MODELS. RESEARCH. STATISTICAL METHODS.

Growth is an important phase in the life of animals which influences the different forms of production such as milk, meat etc. The relationship between body weight and age is important particularly in meat producing animals. Many works have already been done for fitting of non linear growth models and choosing best model to describe growth pattern. In the present study, attention is given to the study of statistical properties of goodness of fit criteria for selecting best model to describe the growth pattern by using bootstrap technique. The distributions of the goodness of fit criteria  $R^2$  (determination coefficient), RMSE (root mean square error) and ARR (absolute reduction ratio) are found to be non-normal. Based on these statistical measures

the best model is selected to describe growth pattern in given body weight data of goat. On comparison of 3 nonlinear growth models, viz. Logistic, Gompertz and Von Bertalanffy model, the third one was found to be the best model.

379. Mandal, Shila; DumDum, Kolkata (India). Dum Dum Motijheel College. An enquiry into the well-being and deprivation of slum dwellers- a case study.. *Journal of Interacademia* (India). (Apr 2015) v19(2) p.249-254 KEYWORDS: SLURRY. POVERTY. EXPENDITURE.

We studied the quality of living and level of deprivation of some typical slum dwellers of an area under Dum Dum Municipality of West Bengal. To this end, we analyzed their population structure, income and expenditure patterns, nature of employment, access to housing, safe-drinking water, sanitation and electricity, educational and health attainment, credit worthiness, and physical possession of some basic amenities in life. Excepting access to safe-drinking water and electricity, they lacked all the vital components for leading a decent living including medical facilities. Eighty per cent of the households and 86.4% of the population of the slum under consideration were living below the poverty line requiring immediate Government interventions.

380. Bara, Shilpi Priya Sunita; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Dept. of Veterinary and Animal Husbandry Extension Education. Ganguli, Debasis; West Bengal University of Animal and Fishery Sciences, Kolkata (India). Dept. of Veterinary and Animal Husbandry Extension Education.. Socio-Economic profile of disaster affected Livestock farmers : The case of Phailin in Odisha.. *Journal of Interacademia* (India). (Apr 2015) v19(2) p.307-311 KEYWORDS: CYCLONES. LIVESTOCK. FARMERS.

Natural disasters like flood, cyclone, earthquake etc. strike almost each and every year. India is one of the most disaster prone areas among the world. Among the states of India Odisha experiences regular cyclones causing huge casualties both to human beings and animals. The landless livestock farmers remain the worst sufferer of these natural disasters leading to changes in their socio economic conditions. The present study was taken up to identify the socio-economic profile of the livestock farmers affected by phailin, the cyclone which struck the state of Odisha in October, 2013.

381. Bulbul, K.H.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Budgam (India). Krishi Vigyan Kendra. Kanth, R.H.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Budgam (India). Krishi Vigyan Kendra. Sheikh, I.U.; Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Budgam (India). Krishi Vigyan Kendra.. Impact studies for employment generating and skill development technologies based training.. *Indian Journal of Animal Production and Management* (India). (Jan-Jun 2015) v31(1-2) p.39-43 KEYWORDS: IMPACT ASSESSMENT. TRAINING. SKILLED LABOUR. EMPLOYMENT.

A pre-requisite questionnaire including employment generating and skill development technologies based training programmes were used to collect data from the trainees for impact analysis of training programmes organized by KVK Sri nagar. The study revealed that 56.42 per cent clientele adopted the technologies among 179 trainees who participated in the employment generating training programme. Study also revealed that 208 participants were attended skill development training programmes and their technologies

adoption rates were found to be 74.52 per cent. Altogether 66.15% adoption rate were recorded during the calendar year of 2012-2013. The highest adoption in the said training programme was found to be broiler farming (79.41 %); whereas lowest in the importance and preparation of feed block (13.33%). Women's role in participation in training programme to achieve the technologies was also observed.

382. Sireesha, K.; NTR College of Veterinary Science, SVVU, Gannavaram (India). Instructional Livestock farm Complex. Prasad, R.M.V.; NTR College of Veterinary Science, SVVU, Gannavaram (India). Instructional Livestock farm Complex. Jagadeeswararao, S.; NTR College of Veterinary Science, SVVU, Gannavaram (India). Instructional Livestock farm Complex. Jayalaxmi, P.; NTR College of Veterinary Science, SVVU, Gannavaram (India). Instructional Livestock farm Complex.. Socio Economic status and constraints faced by shepherds in Guntur District of Andhra Pradesh.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.43-45 KEYWORDS: SOCIOECONOMIC ORGANIZATION. CONSTRAINTS. ANDHRA PRADESH.

A survey was conducted in Guntur district of Andhra Pradesh to collect the information regarding socio economic status of shepherds and constraints faced by them by using structured questionnaire. Survey covers the information regarding their land holding, literacy, their age groups, flock size and constraints in field level. Study revealed that the majorities (63.75%) of sheep farmers were of middle age and most of them were illiterate. About 90% of the respondents indicated that sheep farming was their main occupation of which 52.50% of farmers were landless and 37.92% of farmers were marginal farmers with average land holding of 5.1 to 7.5 acres of land. The major problems faced by the shepherds were lack of grazing lands, middleman hindrance in marketing of sheep and lack of organized meat markets.

383. Sarma, J.; Assam Agricultural University, Sonitpur (India). Krishi Vigyan Kendra. Payeng, S.; Assam Agricultural University, Sonitpur (India). Krishi Vigyan Kendra. Saharia, J.; Assam Agricultural University, Sonitpur (India). Krishi Vigyan Kendra. Roy, M.N.; Assam Agricultural University, Sonitpur (India). Krishi Vigyan Kendra. Bora, L.; Assam Agricultural University, Sonitpur (India). Krishi Vigyan Kendra.. Correlates of Knowledge level of farmers in Sonitpur district of Assam.. Indian Journal of Animal Production and Management (India). (Jan-Jun2015) v31(1-2) p.81-84 KEYWORDS: BROILER CHICKENS. FARMING SYSTEMS. ASSAM.

The study was conducted on 100 broiler farmers of Sonitpur district of Assam in order to find out their socio-economic status, level of knowledge in scientific broiler farming and relationship of knowledge level with their socio-economic status. It was revealed that majority of the respondents were young having passed high school, with marginal land holding, small flock size, short length of experience in broiler farming and low level of participation in training and low level of extension contact and low mass media exposure. Majority had low level of knowledge in scientific broiler farming and two variables viz. Education and experience were found to have significant relation with knowledge level.

384. Prajapati, Vijay S.; Navsari Agricultural University, Navsari (India). Dept. of Livestock Production Management. Singh, Ranjeet Rana; Navsari Agricultural University, Navsari (India). Dept. of Livestock Production

Management.Fulsoundar, A.B.; Navsari Agricultural University, Navsari (India). Dept. of Livestock Production Management.Patel, N.B.; Navsari Agricultural University,Navsari (India). Dept. of Livestock Production Management.Constraints of dairy animal owners in the Navsari district of South Gujarat.. Indian Journal of Animal Production and Management (India).(Jan-Jun 2015) v31(1-2) p.89-92 KEYWORDS: HOUSING. FEEDING. BREEDING METHODS. DAIRY CATTLE. CONSTRAINTS.

A field study was conducted to identify constraints that hinder the dairy animal owners to adopt recommended scientific management practices in the Navsari district of South Gujarat. Majority of the respondents in the survey area were poor and major constraints observed related to housing, feeding and breeding management practices were lack of own capital, high cost of feeding and incidences of repeat breeding, respectively. These constraints are usually area specific and farmer specific. Hence, present study was planned to identify constraints that hinders them to adopt recommended scientific management practices in housing, feeding and breeding management of dairy animals in the Navsari district of south Gujarat.

385. Bara, P.S.; Anand Agricultural University, Anand (India). College of Veterinary Sc. & AH. Livestock Research Station.Shah, S.V.; Anand Agricultural University, Anand (India). College of Veterinary Sc. & AH. Livestock Research Station.Jacob, Ninan; Anand Agricultural University, Anand (India). College of Veterinary Sc. & AH. Livestock Research Station.. Labour utilization for milking operation on a dairy farm. Indian Journal of Animal Production and Management (India). (Jan-Jun 2015) v31(1-2) p.93-96 KEYWORDS: CROSSBREDS. CATTLE. MILKING. LABOUR PRODUCTIVITY.

A study was undertaken to establish time requirement for various activities involved in milking Gir, Kankrej and Crossbred cows maintained at Livestock Research Station, College of Veterinary Science and Animal Husbandry, AAU, Anand. The time taken for bringing the dam and calf from its shed to the milking parlour along with activities in the milking parlour and for taking them back from the milking parlour to its shed was recorded both during morning and evening sessions. The total time (seconds) spent I labour I adult unit I day for milking operation in crossbreds (1228.94) was higher than that recorded in Kankrej (1136.19) and Gir (1069.64) cows. This is due to higher milk yield and machine milking practiced in crossbred cows as compared to lower milk yield and hand milking followed in Kankrej and Gir cows. Variations in milking time might also be due to the intrinsic characteristics and diverse breed behavior.

386. Hegde, Narayan G.; BAIF Development Research Foundation, Pune (India).Deo, Avinash D.; BAIF Development Research Foundation, Pune (India).. Goat value chain development for empowering rural women in India.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9)p.935-940 KEYWORDS: GOATS. RURAL POPULATION. WOMEN. INDIA.

Small land holdings, low agricultural productivity and lack of employment opportunities, have compelled over 25% of the rural population in India, to live in poverty and livestock is a major source of their livelihood. In rural India, 33.014 million households keep goats; 70% of the 135.17 million goats are maintained by the poor for milk, meat, manure and emergency cash reserve. However, they have not been able to realise the potential of goat husbandry due to lack of veterinary services, financial support and market linkage.The only



existing scheme of the Government of India during the XI Five Year Plan (2007-12), spent only 10% of the budget, due to poor interaction with goat keepers. In the absence of good extension network, new technologies could not be transferred to farmers.

387. Kumar, Vijay; ICAR- Indian Veterinary Research Institute, Izatnagar (India). Singh, B.P.; ICAR- Indian Veterinary Research Institute, Izatnagar (India). Triveni, Dutt; ICAR- Indian Veterinary Research Institute, Izatnagar (India). Kumar, Rajesh; ICAR- Indian Veterinary Research Institute, Izatnagar (India). Maousami; ICAR- Indian Veterinary Research Institute, Izatnagar (India). Adoption behavior of goat farmers about improved technologies in semi-arid zone of Uttar Pradesh.. Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1037-1041 KEYWORDS: GOATS. FARMERS. BEHAVIOUR. TECHNOLOGY. SEMIARID CLIMATE.

Average meat yield of goat in India is lower than many developing countries because of under feeding and faulty management practices. There are different improved technologies and practices recommended by experts for goat farmers to get better production and productivity. Present study was conducted in Mainpuri and Firozabad district of Uttar Pradesh among 240 goat farmers to ascertain their adoption behaviour about improved technologies of goat husbandry. Reproduction and health care practices had lowest mean score of adoption, kid management practices had highest mean followed by feeding practices whereas mean score of general management practice fall in between kid and feeding management. Majority of goat farmers were partial adoptors of all the management practices. Education of farmers and their family education status had positive correlation ( $p < 0.05$ ) whereas flock size had negative correlation with adoption index of many management practices. Age, flock size and family size contribute negatively whereas farmer's education, family education status and land holding contribute positively to adoption index of many management practices.

388. Singh, Vikram; Indian Council of Agricultural Research, New Delhi (India). Kumar, Puneet; Indian Council of Agricultural Research, New Delhi (India). Datt, Shiv; Indian Council of Agricultural Research, New Delhi (India). Ponnusamy, K.; Indian Council of Agricultural Research, New Delhi (India).. Intellectual assets management and transfer in animal science sector at the Indian Council of Agricultural Research (ICAR). Indian Journal of Animal Sciences (India). (Sep 2015) v85(9) p.1051-1055 KEYWORDS: INTELLECTUAL PROPERTY RIGHTS. PARTNERSHIPS. PATENTS. TECHNOLOGY TRANSFER.

Intellectual assets in animal science at the Indian Council of Agricultural Research (ICAR) such as vaccines, diagnostic kits, food products and processes, know-how, designs, parameters are managed by protecting with the different Intellectual Property (IP) tools such as patents, trademarks, and designs. A three tier IP management system of ICAR is given a range of proven results, including 245 patent applications filed by 15 animal science research institutes, out of which 130 were filed during 2007 to 2012 and 39 in 2013-14 in 12 subject specific areas of animal science. A total of 22 patent applications were granted to five research institutes, which falls under six classes (A, B, C, D, F, G and H) of the IPC classification, as specified in its 24 sub-classes. Eighteen trademarks were filed by four ICAR institutes in different groups of trademark classes for their goods and services. IVRI, Izatnagar had also filed 13 designs for their engineering items and product development. To transfer such intellectual

assets, 166 partnerships were developed by 12 ICAR institutes for 102 technologies. These assets belong to 12 different subject specific areas of animal science. These assets were transferred through different modes of commercialization to 110 public and private organizations. IP protected asset transfer was on its higher side with 21.56 per cent, which is a successful indicator for ICAR as a research organization. The outcome of these efforts has opened the path for research and its incubation in the mode of business for well being of its major clients including farmer and livestock industry.

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6. National Research Centre for Soybean  
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7. Indian Grassland & Fodder Research Institute  
Jhansi-284 003, Uttar Pradesh
8. Indian Institute of Sugarcane Research  
Lucknow-226 002, Uttar Pradesh
9. Indian Veterinary Research Institute  
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New Delhi-110012
11. National Centre for Agricultural Economics & Policy Research  
Library Avenue, Pusa,  
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Sirsa Road, Hisar-125001, Haryana
13. National Research Centre for Equines  
Hisar-125001, Haryana
14. Central Inland Fisheries Research Institute  
Barrackpore-700120, West Bengal
15. National Institute of Research on Jute & Allied Fibre Technology  
12, Regent Park, Kolkata-700040,  
West Bengal
16. Directorate of Oilseeds Research  
Hyderabad-500 030, Andhra Pradesh
17. Central Potato Research Institute  
Shimla-171 001, Himachal Pradesh
18. Central Tobacco Research Institute  
Bhaskar Nagar, Rajamundry-  
533105, Andhra Pradesh
19. Central Plantation Crops Research Institute  
Kasargod-671124, Kerala
20. National Bureau of Animal Genetic Resource  
P.B. No.129, Karnal-132 001,  
Haryana

21. Central Research Institute for Jute & Allied Fibres  
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22. Central Research Institute for Dryland Agriculture  
Hyderabad-500 059,  
Andhra Pradesh
23. Central Avian Research Institute  
Izatnagar-243 122, Uttar Pradesh
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75, Santhome High Road,  
Raja Annamalaipuram,  
Chennai-600028, Tamilnadu
27. Central Institute of Fisheries Education  
Panch Marg, off yari Road, Andheri (West),  
Mumbai-400061, Maharashtra
28. Central Institute for Research on Goats  
Makhdoom, Mathura-281122,  
Uttar Pradesh
29. Crop Protection Research Centre (CPRC)  
St. Xavier's College, Tirunelveli,  
Tamilnadu
30. Central Soil Salinity Research Institute  
Karnal 132001, Haryana
31. Central Tuber Crops Research Institute  
Sreekariyam, Thiruvananthapuram -695017, Kerala
32. National Bureau of Animal Genetic Resources  
G.T. Road Bye-Pass, P.B.No.129,  
Near Basant Vihar,  
Karnal-132001, Haryana
33. National Bureau of Plant Genetic Resources  
Pusa Campus, New Delhi 110012
34. National Centre for Integrated Pest Management  
LBS Building, Pusa Campus,  
New Delhi-110012
35. National Dairy Research Institute  
Karnal-132001, Haryana
36. National Research Centre on Camel  
Post Bag No.07, Jorbeer,  
Bikaner-334001, Rajasthan
37. Directorate of Groundnut Research  
Ivenagar Road P.B.No.5,  
Junagadh-362001, Gujarat
38. National Research Centre for Citrus  
Nagpur, Maharashtra
39. National Research Centre on Mithun  
Jharnapani, P.O. Medziphema-797106

40. Directorate of Knowledge Management in Agriculture (DKMA)  
ICAR, KAB-I, Pusa Campus, New Delhi-110012
41. Indian Institute of Pulses Research (IIPR)  
Kalyanpur, Kanpur-208024 (U.P.)
42. Central Rice Research Institute  
Cuttack-753006 (Odisha)
43. Society for Plant Protection Sciences  
Div. of Nematology, LBS Centre, IARI, Pusa Campus, New Delhi-110012
44. Soil Conservation Society of India National Societies Block  
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