

589 Animal genetic resources of Indian subcontinent, their unique features and conservation. S. P. S. Ahlawat* and S. C. Gupta, *National Bureau of Animal Genetic Resources, Karnal, Haryana, India.*

Traditionally, India has been a mega bio-diversity centre and rearing of domesticated animals was practiced since time immemorial. Almost all the major livestock species including cattle, buffalo, sheep, goats, pigs, camels, horses, donkeys, yak and mithun are found in India. Apart from poultry, domesticated species of avian such as ducks, geese, quail, turkey, pheasants and partridges also exist in India. There are over 140 domesticated species, well documented and defined breeds, whereas per FAO watch list there are about 220 breeds. The existence of wild ancestral species of sheep like *Ovis musimon*, *O. vagnis*, *O. orientalis*, *O. amon*, wild goats like Himalayan Ibex, Himalayan Tahr, Nilgiri Tahr and Markhors, Wild Yaks (*Bos mutus*), Gaur (*Bos gaurus*), Red Jungle Fowl and Snow Partridges in natural habitat, further make this subcontinent a treasure of farm animal biodiversity. Conservation of all forms of life has been the ethos of human society in India since ancient times. The major basis of maintaining such a large bio-diversity was through the sustainable management of resources and their ecosystem. Further, this livestock genetic resource diversity has been the integral component of Indian agriculture. It is well documented that Indigenous livestock breeds are disease resistant to many tropical diseases, The greater heat and water scarcity tolerance make them ideal germplasm for their wider use for production in hot and resource poor agroclimatic zones besides their rich gene pool for introgression in high producing breeds from developed countries. In this paper, an overview of all the available germplasm of farm livestock and poultry species and breeds available and sustaining Indian agriculture for centuries, their production, reproduction and disease profiles has been discussed.

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Key Words: Indigenous Livestock, Disease Resistant, Conservation

590 Relationships between chemical composition and *in vitro* volatile fatty acid profile of the diet consumed by range sheep. A. Cerrillo-Soto*, K. Landa-Salas, G. Nevarez-Carrasco, R. Montoya-Escalante, and A. Juarez-Reyes, *Universidad Juarez del Estado de Durango, Durango, Dgo. Mexico.*

Samples from the diet consumed by sheep grazing in a semiarid region of North Mexico were used to study relationships between chemical composition and *in vitro* volatile fatty acid (VFA) profile. Dietary samples were collected using three esophageal fistulated sheep from a 100 head flock. The sampling was performed two days each month, from August 2002 to June 2003. The samples (200 mg DM) were incubated in calibrated 100 ml glass syringes using rumen fluid from two sheep fed alfalfa hay and concentrate (70:30) as inoculum. Incubations were terminated after 24 h for metabolizable energy (ME) and VFA estimations. The ME content was obtained as: ME (Mcal/kg) = 0.1456 (ml gas) + 0.07675 (CP %) + 0.162 (fat %) + 1.198. Volatile fatty acid determination was performed from syringe contents using gas chromatography. Data were analyzed by ANOVA according to a completely randomized design. Simple linear correlation coefficients between chemical composition and *in vitro* VFA production were computed by PROC REG (SAS). Mean values (% DM) for OM, CP, NDF, ADF, lignin, hemicellulose and cellulose were 80.0, 18.8, 54.0, 35.2, 13.7, 18.9 and 21.5, respectively and differed between months of sampling ($P < 0.05$). The mean content of ME was 1.7 Mcal/kg. Concentrations of VFA were 37.5, 24.0, 6.1, 0.78, 4.02, 1.6 and 0.89 mMol⁻¹, for total VFA, acetate, propionate, butyrate, isobutyrate, valerate and isovalerate, respectively and were different among months ($P < 0.05$). Negative correlations ($P < 0.001$) were registered between lignin and total VFA ($r = -0.70$), acetate ($r = -0.67$), propionate ($r = -0.67$) and butyrate ($r = -0.75$). Negative correlations ($P < 0.05$) were also recorded between FDA and total and individual VFA. Results indicated that the ME content of the diet selected by the animals did not meet their energy requirements most of the year. Negative correlations between cell wall

constituents and total and individual VFA concentrations may indicate the negative effect these chemical compounds exert on the *in vitro* gas production.

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Key Words: Gas Production, Grazing, North Mexico

591 Meat production using crop residues from eight maize cultivars as feed for sheep. S. Fernandez-Rivera*¹ and S. Twumasi-Afriyie², ¹*International Livestock Research Institute, Addis Ababa, Ethiopia.* ²*International Maize and Wheat Improvement Center, Addis Ababa, Ethiopia.*

Our hypotheses were: 1) maize cultivars differ in nutritive value of their stover as assessed by the amount of meat produced by sheep fed on these residues, and 2) the amount of meat produced by using maize stover as feed is not related to grain yield (GHA, kg/ha). Eight maize cultivars (four commercial hybrids and four open pollinated varieties) were planted in a randomized complete block design with three replicates. After grain harvest the stover (husk excluded) was evaluated as feed for sheep. Seventy-two male lambs (22.2±0.1 kg BW) were allotted by weight to cultivars and replicates and fed individually diets with 10.5% CP consisting of 80% stover and 20% supplement. After 90 d the sheep were slaughtered and the cold carcass (CC) weight was determined. The amount of meat produced per ha (MHA, kg CC/ha) was estimated from initial and final BW, ADG, CC dressing, stover DMI per animal and stover yield (SHA, kg DM/ha). Cultivars differed in GHA (1951-2798 kg/ha, SEM=240, $P \leq 0.06$), SHA (1632-4442 kg DM/ha, SEM=404, $P \leq 0.01$), stover NDF (599-684 g/kg DM, SEM=13, $P \leq 0.01$), stover ADF (420-492 g/kg DM, SEM=10, $P \leq 0.01$), stover DMI (44-54 g DM/kg BW^{0.75}, SEM=1.5, $P \leq 0.03$), meat produced per lamb (8.8-10.3 kg CC/animal, SEM=0.3, $P \leq 0.04$) and MHA (119-317 kg CC/ha, SEM=41, $P \leq 0.07$). Ranking of varieties for CC did not correspond with that for MHA. GHA was correlated negatively with stover NDF ($r^2=0.17$, $P \leq 0.05$), stover ADF ($r^2=0.14$, $P \leq 0.07$) and meat produced per lamb ($r^2=0.17$, $P \leq 0.05$). Stover DMI (g/kg BW^{0.75}) and stover ADF accounted ($P \leq 0.01$) for 0.60 of the variation in ADG and 0.65 of the variation in meat produced per animal (kg CC). MHA was predicted from ADG (g/d) and SHA with the equation $MHA = 2.991 (\pm 0.683) ADG + 0.0341 (\pm 0.0056) SHA$, $R^2=0.95$, $P \leq 0.01$. Developing dual-purpose (food and feed) maize cultivars needs to address potential tradeoffs between grain yield and stover nutritive value and exploit variation in stover nutritive value as well as in stover yield.

Key Words: Crop Residues, Maize, Sheep

592 Post tsunami disaster livestock development: Can the vulnerability be reduced? The case of Aceh, Indonesia. C. Wollny* and G. Tesfahun, *Georg-August University, Goettingen, Germany.*

The densely populated Indonesia's Aceh province was the most affected area with nearly 170,000 people reported dead and at least 1550 villages destroyed.

The magnitude of the devastations of the Tsunami is massive requiring international efforts to reconstruct and rebuild the livelihood base.

This paper presents a conceptual framework to reestablish the livelihoods in Aceh with an investment on risk sensitive and quick return livestock production system. The frame conditions are characterised by large scale devastations of the infrastructure, chaotic short-term activities of all kind of aid organisations, political and economic instability and conflicting interests as well as a large number of traumatised people. Our fact findings missions showed that in the short-term immediate needs of the survivors such as building confidence and enterprise establishment are on focus whereas in the long-term agricultural systems development would be the main intervention.

Destruction of aquaculture and rice fields support a strong argument that livestock are among the few options for fast recovery. Poultry, cattle and goats among others were the most popular species before the quake. The paper is advocating a participatory approach and integration of the existing network of university alumni in Indonesia. The concept is built on the assumption that sustainable agricultural development requires well adapted livestock for re-stocking. Risk sensitive development of livestock production system is of key strategic importance and includes capacity building and training of farmers as well as stakeholder participation. The masterplan consists of a comprehensive 5-

years plan of action ranging from introducing specific husbandry practices to reestablishing the livestock population through local breeds of the preferred species. The challenge offers opportunities for global partnerships.

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Key Words: Livestock Development, Disaster Management, Indonesia

Lactation Biology

593 Evidence of a role of prolactin in mediating photoperiodic effects during the dry period. H. M. Crawford^{*1}, J. L. Dauderman¹, D. E. Morin¹, T. B. McFadden², and G. E. Dahl¹, ¹University of Illinois, Urbana, ²University of Vermont, Burlington.

Short day photoperiod (SDPP) during the dry period increases milk production in the subsequent lactation relative to long day photoperiod (LDPP). In addition we have observed that SDPP improves immune function during the transition compared with LDPP. Our hypothesis is that mammary and immune responses under SDPP result from increased prolactin (PRL) sensitivity. In the present study our objective was to determine if exogenous PRL administered to cows on a SDPP would cause production and immune responses to be similar to those of cows on LDPP. To test this we assigned 24 multiparous Holstein cows to one of three treatments during their dry period: LDPP (16L:8D), SDPP (8L:16D), and SDPP+PRL (SDPP and recombinant bovine PRL). In the SDPP+PRL group, 12mg/d of PRL was continuously delivered via subcutaneous osmotic minipump for the last 30 days of pregnancy to match circulating concentrations of the LDPP cows, yet maintain other photoperiod factors consistent with SDPP. During the dry period, weekly blood samples were taken to quantify PRL concentrations. Treatments ended at calving when all cows were moved to an ambient photoperiod and milked two times daily for the entire lactation. SDPP+PRL cows calved 5.5 d earlier than SDPP and LDPP cows ($P < 0.11$), resulting in 21 d of PRL treatment prior to calving. DMI as a percentage of body weight did not differ between LDPP and SDPP for weeks -8 to -4, but for weeks -3 to 0 DMI was greater in SDPP cows than SDPP+PRL cows, but SDPP+PRL did not differ from LDPP. The periparturient PRL surge was 26.4, 29.5, and 36.3ng/mL for SDPP, SDPP+PRL, and LDPP. Milk production was inversely related to the periparturient PRL surge. Milk production through 120 d of lactation averaged 42.0, 39.5, and 35.8 kg/d for SDPP, SDPP+PRL and LDPP cows ($P < 0.04$). There were no differences among groups in postpartum BW or DMI, or prepartum BW. These results support the concept that circulating PRL during the dry period is inversely related to subsequent milk yield.

Key Words: Dry Period, Prolactin, Photoperiod

594 Lactational effects of the dry off period in dairy goats. A. A. K. Salama, G. Caja^{*}, X. Such, E. Albanell, and R. Casals, *Universitat Autònoma de Barcelona, Bellaterra, Spain.*

Seventeen Murciano-Granadina multiparous dairy goats, milked once daily throughout lactation, were used to study the effects of the dry off period on the following lactation. Goats were impregnated at 210 DIM and assigned to two experimental groups at 300 DIM. Treatments were: 1) **D56**, dried off for 56 d before the expected kidding ($n = 9$); and, 2) **ND**, not dried ($n = 8$). Milk yield was recorded weekly during the preceding (561 ± 22 L/goat) and the following lactation. Five goats (63%) in the ND group dried off spontaneously at $d 27 \pm 4$ before kidding and were considered as a separate group (**D27**; $n = 5$). Kids were

weighed at parturition and removed before sucking. Colostrum samples were taken for milk components and IgG analysis. Mammary biopsies were taken at 280 DIM in the preceding lactation, d 7 after drying off (D56 group only), and d 49 in the following lactation (all groups). Apoptotic and proliferating cells were detected immunohistochemically by TUNEL and PCNA assays, respectively. Litter size (2.25 kids/goat) did not vary between groups, but ND kids had lower birth weight (1.7 kg; $P < 0.05$) than D56 (2.1 kg) and D27 (2.2 kg). Colostrum of ND goats contained lower IgG (5.6 mg/ml; $P < 0.001$) than D56 (42.4 mg/mL) and D27 (32.9 mg/mL) goats. In the following lactation (210 DIM), ND goats produced less milk (1.66 L/d; $P < 0.05$) than D56 (2.32 L/d) and D27 (2.45 L/d) goats. Comparing d 280 (late lactation) with d 7 after dry off (involution) in D56 goats, an increase in apoptosis (0.51 to 1.75%; $P < 0.06$) and proliferation (2.09 to 7.12% $P < 0.05$) of the mammary tissue was observed. At d 49 of the following lactation there were no differences between groups in apoptosis (0.71, 0.68 and 0.65%) or proliferation indices (2.95, 1.37 and 2.48%) for D56, D27 and ND, respectively. These results indicate that the length of the dry off period (27 or 56 d) did not affect mammary cell turnover in the following lactation. Omitting the dry period reduced colostrum quality and milk yield in dairy goats. Goats which spontaneously dried off for approximately one month were as productive as the goats that dried off for approximately two months.

Key Words: Apoptosis, Mammary Involution, Milking Frequency

595 Effects of milking interval on hourly milk secretion rate in goats. G. Pulina^{*}, S. Fancellu, G. Battacone, and A. Nudda, *University of Sassari, Sassari, Italy.*

The effects of milking interval on secretion rate of milk, fat, protein, casein, lactose and fatty acids (FA) in dairy goats were investigated. Twenty Saanen lactating goats in mid lactation were used in a 4x4 Latin Square experimental design with 5 replications. Goats were allocated in four milking interval treatments: 3, 6, 12 and 24 hours after receiving at the morning milking (0 hr), i.v injection of 1 IU of oxytocin to remove residual milk. The goats were machine milked and stripped by hand. Milk yields were recorded and milk samples were collected at each milking. A regular twice daily milking (12 hr interval) was restored between each experimental period. The hourly secretion rates of milk, fat, protein, casein, lactose and FA were calculated. The hourly secretion rates of milk and lactose decreased up to 3 hr ($P < 0.05$). The fat content is the milk component mostly affected by prolonged milking interval, decreasing linearly as milking intervals increased. The hourly secretion rate of FA does not seem to have a defined trend.