XI/EESE 1.1 Development of Tests, Scales to Measure Knowledge and Attitude of the Goat Farmers Towards Selected Goat Husbandry Practices

R.L. Sagar, Khushyal Singh and Braj Mohan

A survey of goat farmers' knowledge and attitude require reliable tests and scales for the adoption of goat husbandry practices. The tests and scales are not available at present on the goat husbandry practices. It is believed that the goat farmers who have more knowledge and favourable attitude towards goat husbandry practices are more likely to obtain higher production from their goats. Keeping this in view an attempt has been made to develop tests and scales to measure the goat farmers' knowledge and attitude towards some selected goat husbandry practices. In the light of research project some relevant studies in connection with the knowledge level and attitude towards innovations conducted in various parts of India have been consulted and reviewed.

The Knowledge Tests

In the present study the knowledge tests for measuring level of knowledge of the selected goat husbandry practices viz H.S., F.M.D., PPR., ET and goat pox and vaccination against them, de-worming in small ruminants, artificial insemination in goats, feeding of mineral mixture and goat milk paneer are being developed.

Item Collection: The content of knowledge that is composed of questions called items. Items for the test were compiled from different sources, such as literature, field extension personnel, subject matter specialists in animal and agricultural sciences and the researchers' own experience. The questions were designed to test the knowledge level of goat farmers about goat husbandry practices. The items were collected in relation to vaccination against knowledge about H.S., F.M.D., P.P.R., E.T., deworming in small ruminants, artificial insemination in goats, feeding of mineral mixture and goat milk paneer.

Initial Selection of Items: The selection of items was done on the basis of the following criteria.

It should promote thinking rather than rote memorization, and

It should differentiate the well informed goat farmers from the poorly informed ones and should have a certain difficulty value.

The procedure followed in selection of the test items was on the lines used by Jaiswal (1965), Chaudhari (1978), Sagar (1983) and Goswami (1987).

Based on these two criteria 190 items were initially constructed out of which 67 were about H.S., F.M.D., P.P.R., E.T., goat pox and vaccination against them, 25 about deworming, 46 about artificial insemination in goats, 22 about feeding of mineral mixture and 30 about goat milk paneer. A schedule was prepared with these 190 items for administering to the goat farmers for item analysis and screen out further items. All the 190 items collected for construction of the knowledge test were in objective form and were in dichotomous or multiple-choice format.

The Attitude Scale

In order to construct the attitude scales for quantitative measurement of the selected goat husbandry practices viz. vaccination against contagious diseases, deworming in small ruminants, artificial insemination in goats, feeding of mineral mixture and goat milk paneer, a modified form of Likert technique is being used. Having decided on the scaling technique, actual preparation of the scales has been undertaken.

Collection of Items Attitude Statements: The particular situation or object that evokes the response is called an item. The first step in developing the scales is the collection of items (Statements) in such a manner that the acceptance or rejection of each one implies a different degree of favourable or unfavourable attitude towards the innovation being studied so that the important and relevant statements could

be delineated and selected. As such, on the basis of relevant literature, informal discussions with the specialists and goat farmers of Transfer of Technology villages of the Institute, 60 statements for vaccination against contagious diseases, 52 for deworming in small ruminants, 58 for artificial insemination in goats, 38 for feeding of mineral mixture and 42 for goat milk paneer were initially prepared. The criteria as suggested by Edwards (1969) have been utilized for editing scale items or statements. The statements are ready to be sent to the judges for rating.

XI/EESE 1.2 Study on Adoption of Goat Production Technology

Braj Mohan, R.L Sagar

Conducted preliminary survey in Daulatpur non-operational village of Farah Block of Mathura District, U.P. About 389 hectares irrigated land was available with farmers in Daulatpur village and non-irrigated land was nil. Out of 305 households, maximum number of households were observed of Jatav community and found to be 150 families followed by Thakur (100), Baghel (50), Balmik (04) and Brahmin (01). The highest number of goat keepers were observed in Jatav community and found to be 100 numbers whereas in Baghel (12), Thakur (03) and Balmik (01). The total goat keepers were 116. The goat population was observed to be in quite good numbers and found to be about 400 goats of Barbari, Sirohi and non-descript breeds. Big flocks and maximum goats were with Baghel community. Similarly, Fatiha non-operational village of Farah Block of Mathura District, U.P., was also visited to collect basic information for the above project. About 91.53 hectares irrigated land was available with farmers in Fatiha village and non- irrigated land was nil. Out of 200 households, maximum number of households were observed of Thakur community and found to be 100 families followed by Jatav (60), Baghel (30), Koli (04), Balmik (04) and Barber (02). The highest number of goat keepers were observed in Baghel community and found to be 09 numbers whereas in Thakur (07), Jatav (06), Balmik (04) and Koli (01). The total goat keepers were about 27. The goat population was observed to be in good numbers and found to be about 200 goats of Barbari and non-descript breeds.

An interview schedule was developed on socio-economic and psychological, agro-situational, extension communication, awareness, adoption, etc., of improved goat husbandry practices. Pre-tested and standardized the interview schedule for data collection. Data were collected from 11 goat farmers in operational and non-operational villages through personal interview with the help of structured schedule. All 11 goat farmers adopted goat husbandry practices such as vaccination like, P.P.R., E.T., F.M.D., H.S., etc., and deworming of animals. Five land owner goat farmers produced green fodder mainly for large animals and same was offered to their goats. Out of 11 goat farmers, 2 adopted goat milk paneer technology and only 1 was feeding mineral mixture. Non used the Burdizzo castrator for castration and artificial insemination was also nil.

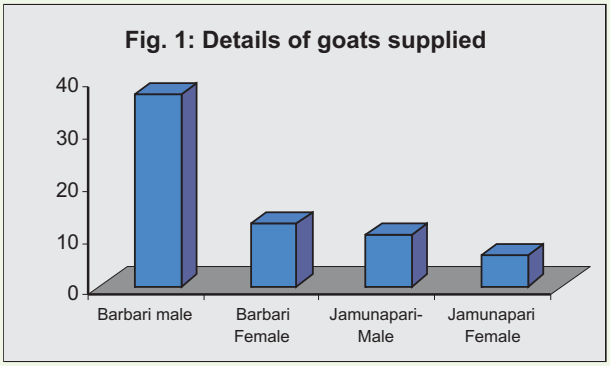
XI/EESE 1.3 Impact of Improved Technologies and Emerging Market Conditions on Goat Production System

Shalander Kumar, K. Singh and M.K. Singh

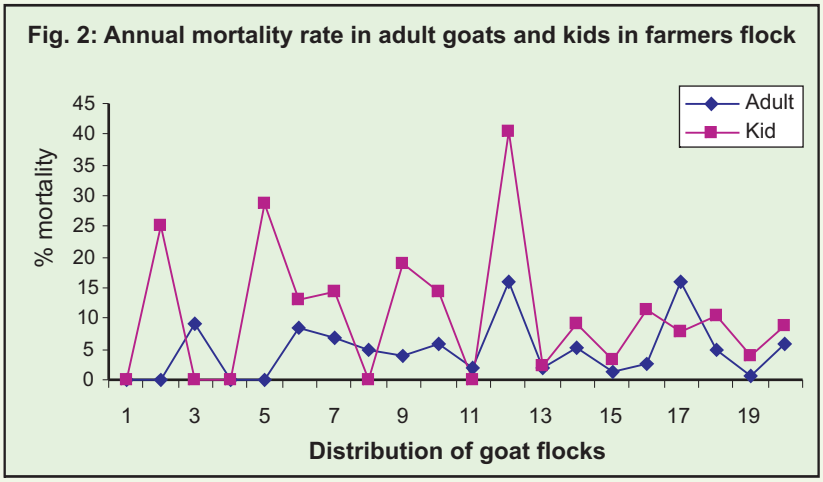
The information on diffusion of superior breeding goats and improved technologies from CIRG in the last five years was collected. The information and 850 addresses were also gathered about persons acquired superior germ plasm and training on improved goat farming from CIRG and so also the commercial goat farms operating in different parts of the country. A questionnaire was developed to elicit information from the above beneficiaries of the improved germ plasm and improved technologies. This questionnaire was posted to 835 beneficiaries. Twenty beneficiaries have responded yet. A preliminary analysis of data collected from these 20 goat farmers have been presented below:

Table 1: Details of flock size of goat keepers

Category	No. of goat keepers	Adult male	Adult female	Kid	Total goats
I (< 50 goats)	10	1.67	14.50	8.78	23.90
II (> 50 goats)	10	14.10	96.90	47.20	158.20
Overall	20	7.8	55.7	27.55	91.05



The flock size of goats (no. of does) of different farmers ranged from 2 to 245. The goat farmers were post-stratified into two categories, namely, category I (<50 goats) and category II (> 50 goats) with average flock size of 15 and 97 does respectively (Table 1). Barbari breeding male constituted the largest share among the total goats supplied by CIRG to farmers (Fig. 1). The mortality in adult goats supplied from CIRG to the field was quite high mainly due to sudden change in the environment and heavy transit stress and sometime due to poor access to prophylactic measures. The adult mortality in the overall flocks of the farmers was not very high with less than 10 per cent. There was large variation in the kid mortality rate among different flocks (Fig. 2). A number of flocks suffered with high mortality in kids. There may be may be many factors of high mortality like low adoption of improved practices, non-availability of critical inputs, low awareness, size of flock, type of housing, etc. However, the detailed analysis to know the reasons of variation in mortality is being carried out.



Majority of the farmers were rearing pure breed animals of Sirohi, Barbari, Osmanabadi, Boer cross, Jamunapari breeds. Sirohi was liked by the maximum farmers (40 %) followed by non descript. The farmers had awareness about the advantages of rearing pure breed goats (Fig. 3). Comparatively higher market price and good reputation among the goat breeders were the main attractions of rearing pure breed goats. In farmers' perception the Sirohi was the most hardy breed capable of surviving under adverse conditions followed by local non-descript and Osmanabadi breeds (Fig. 4).

All the farmers had some exposure of training and interaction with the CIRG / other relevant institutions and their awareness of improved technologies of goat production was very high as indicated in the Fig. 5. The level of adoption of these technologies was also reasonably good. The

variation in the level of adoption and impact of technologies is being analyzed using appropriate analytical tools.

Fig. 3: Farmers perception of rearing pure breed

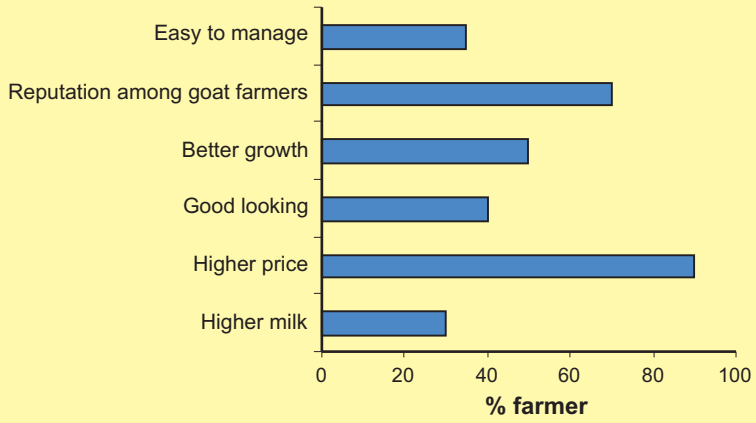


Fig. 4: Farmers perception of advantages of pure breed goats

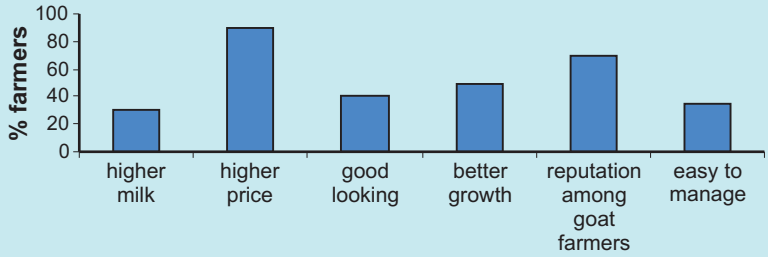
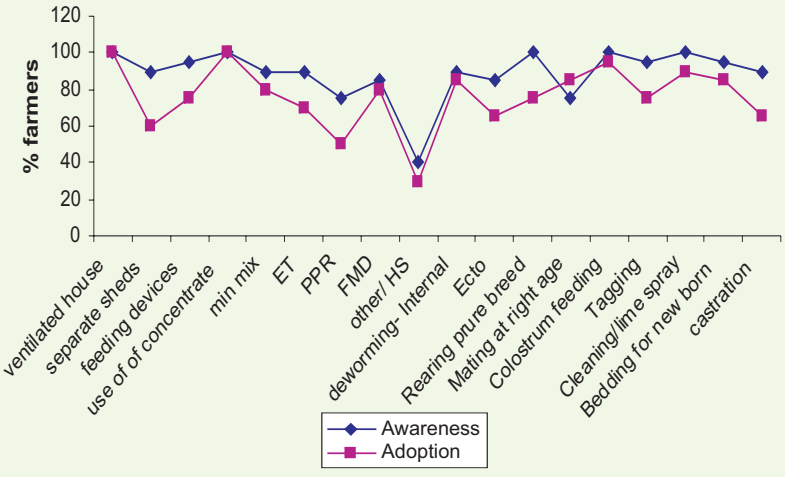


Fig. 5: Level of farmers' awareness and adoption of technologies



XI/EESE 1.4 A Study on Impact of Various Training Programmes on Commercial Goat Farmin

Khushyal Singh, R.L. Sagar and Braj Mohan

The review of literature was collected on impact of training programmes on goat farming. An interview schedule was developed to collect information on the socio-economic aspects, sources of information, marketing problems, knowledge utilization and constraints in commercial goat farming etc. Interview schedule was pre-tested and standardized. A list of addresses was prepared of trainees who attended the national training programme on commercial goat farming and scientific goat rearing trainings for mailing questionnaire/ interview schedule.

EXTENSION EDUCATION

Organization of exhibition

An exhibition was organized during the National Goat Fair and Scientists-Entrepreneurs- Farmers Interactive Meet held at CIRG, Makhdoom on March 1-3, 2008. In this exhibition, 15 stalls were put by the ICAR Institutes, Agricultural University, KVKs, Pharmaceuticals, Book Publishers, NGOs, etc. The main objective of the exhibition was to enlighten the goat farmers, entrepreneurs, scientists and development officers with the latest technology of goat farming and allied areas. About 1500 people visited the exhibition.

Participation in exhibition/ Kisan Mela

Participated and put a stall in the Kisan Mela evam Krishi va Pashu Pradarshani at Pt. Deen Dayal Upadhyay Veterinary University and Cow Research Institute, Mathura, U.P. on March 25-26, 2008.

Participated and put a stall in the exhibition of Agro-Food and Value-added Products of ICAR at New Delhi on the occasion of ICAR Foundation Day at NASC Complex, New Delhi on July 16-17, 2007.

Participated and put a stall in the exhibition of Indian Agro- Industry Expo-2007 at Pragati Maidan, New Delhi on August 16-18, 2007.

Participated in Krishi evam Gramya Vikas Pradarshani at Nagla Chandra Bhan (Deen Dayal Dham) Farah on 7-9 October, 2007.

Participated put a stall in Kisan Mela and Pashu Vigyan Pradarshani at IVRI, Izatnagar, Bareilly, U.P. on November 1-3, 2007.

Participated and put a stall in Bhed Mela, Kisan Goshthi and Pradarshani at CSWRI, Avikanagar (Raj.) on 4.1.2008

Technical correspondence

In all 1,371 technical inquiry letters of which 1,187 in Hindi and 184 in English were received from different categories of aspirant farmers and development agencies covering different parts of the country on various aspects of goat production. All the letters were replied suitably.

AICRP ON GOAT

AICRP on Goat Improvement

N.P. Singh and B. Rai

Jamunapari farm Unit is located at CIRG, Makhdoom. The opening and closing balances of Jamunapari flock were 549 and 634. The population growth rate during the year was 100.99%. The overall survivability of the flock was above 93%. Mean body weights of kids at birth, 3, 6, 9 and 12 months of age were 3.28 ± 0.03, 11.99 ± 0.14, 16.41 ± 0.22, 21.54 ± 0.38 and 27.06 ± 0.38 kg, respectively during the 2007-08. Male kids were born with higher birth weight and maintained this superiority up to 12 months of age. The

heritability estimates for body weight at birth, 3, 6, 9 and 12 months of age were 0.272±0.068, 0.169±0.076, 0.230±0.064, 0.213±0.003 and 0.327±0.073 respectively. Average milk yield in 90 days, 140 days, Total lactation Yield and lactation length were 103.11±2.04, 143.68±2.94,152.78±4.17 liters and 169.98±3.09 days, respectively of the does kidded in the year 2007. The average age at first kidding, weight at first kidding and kidding interval for the year 2007-08 were 754±21 days, 32.6±0.5 kg and 323±5 days, respectively. The Multiple birth rates and litter size were 34.2% and 134%, respectively. Thirty-three males and twenty-two females were supplied to farmers, SAUs, NGOs and other research institutions for improvement and conservation of Jamunapari goats under field conditions.

Barbari Farm Unit is located at CIRG, Makhdoom. In the beginning of the year, out of 744 Barbari goats in the farm, 280 were adult females, 98 adult males and 346 were kids below 12 month of age. During the year, 538 kids were born. It worked out to 1.78 kids per available adult doe in the beginning of the year. The overall population growth was 164% the best over the years. The body weights of kids born during the year 2006 at birth, 3, 6, 9 and 12 month were 1.84±0.01, 6.11±0.10, 2.38±0.18, 17.19±0.10 and 23.58±0.28 kg, respectively. Year of birth had significant effect on the weights at different ages. Overall mean for 90 days milk yield, lactation yield, and lactation length among the does kidded during 2007 were 58.81±1.52, 62.21±1.84 liters and 109.80±1.32 days respectively, which was higher in comparison to previous years. The h^2 estimates for MY 90, LMY and LL were 0.333±0.071, 0.303±0.068, 0.107±0.052, respectively. The selection differential at 9 months body weight was 5.16 kg during the year and for 90 days milk yield it was 20.6 liters. Tupping per centage was 156.7% and kidding rate was 1.53. One hundred sixteen (116) males and fifty eight (58) females were supplied to farmers, SAUs, NGOs and other research institutions for improvement and conservation of Barbari goats under field conditions.

Sirohi goat unit has been established in the breeding tract of Sirohi goats, since December 1976 at CSWRI, Avikanagar (Rajasthan). Performance of this breed at farm for the year 2007-08 with regards to body weight at birth, 3,

6, 9 and 12 months of age were 3.09±0.44, 12.23±0.18, 15.48±0.31, 19.07±0.30 and 23.74±0.33 kg, respectively. The milk yield of the does kidded during 2007-08 averaged 74.43±1.58 for 90 days, 97.24±2.21 kg for 150 days and 107.93±3.36kg for total lactation. Lactational length was 175.49±4.17days. The tupping and kidding per centage on the basis of does available were 90.07 and 83.83 respectively. The selection differentials of selected male kids from population for 9 months body weight and their dam's 1st lactation at 150 days milk yield was 4.75 and 13.81 respectively. 71 males and 03 females (total 74 animals) were sold to breeders to genetically improve their goat flocks.

Jamunapari Goat Field Unit is going on in the two villages of Chakarnagar, block of Etawah district (U.P). The flock strength of Jamunapari Goats in the two villages was 293 during the year 2007-08. The body weight of the kids at birth, 3, 6 and 9 Months of age were 2.42±0.05,

14.53±0.16, 21.14±0.39 and 26.24±0.49 kg, respectively. The multiple birth was 64.6 per cent and fertility was 75.45% during the year. The kidding rate was recorded 148 per cent under field conditions. The average daily milk yield was 1.134±0.015 lit. The total milk yield at 30, 60 and 90 days of lactation were 32.52, 72.12 and 110.82 lit, respectively. The milk yield up to fourth fortnight with respect to birth status was observed as 65.640, 69.075 and 82.005 lit in single, twins and triplet kidded does, respectively.

Ganjam Goat Field Unit is located at OUAandT, Bhubaneshwar. The information regarding production and reproduction parameters was collected from 1453 goats in the adopted area. The average body weights of male kids at birth, 3, 6, 9 and 12 months of age were 2.35±0.02, 6.82±0.02, 9.36±0.03, 13.30±0.04 and 17.33±0.06 kg respectively. The average daily milk yield was 418.28±9.54 ml with total milk production of 73.86±1.25 litres in 176.58 days of lactation. The kidding per centage on the basis of does tupped was 68.99. A total number of 2003 goats were provided prophylactic assistance in the form of vaccination and deworming in the project area. The Socio-economic studies revealed that in the Ganjam district of Orissa state the goat is a primary source of income of tribals (Gola). The goat rearing contributed 70.00 per cent of their annual income.

Malabari goat field Unit is located at KAU, Trichur. A total of 468 goats were registered during the year 2007-08. Out of these only 299 (63.89%) were available for recording data till the end of year. The means weight at birth, 3, 6, 9 and 12 Months of age were 2.28±0.07, 9.04±0.14, 16.17±0.56, 18.09±1.00 and 24.63±0.94 kg, respectively. The average lactation length yield was found to be 45.72±3.94 lit. the average gestation length,

age at first kidding and inter kidding interval were 147.37±1.42, 394.47±25.73 and 274.0±21.3 days, respectively. The incidence of single, twins, triplet and quadruplet births were 43.37, 49.34, 5.96 and 1.33 per cent, respectively. The kidding rate was 1.65. The selection differential was 5.74 kg and genetic gain was 1.00 kg. 25 bucks were distributed during the year 2007-08.

Surti Goat Field Unit is located at Navsari Agriculture University, Navsari (Gujarat). The survey work on the Surti goats was conducted in 3 centres of the Bharuch district. Flock statistics data for the year 2007-08 presented in the annual report indicated that during the year the opening balance was 145 and closing balance was 186. The overall means for body weight at birth 3, 6, 9 and 12 months of age were 2.90±0.06, 9.23±0.26, 12.85±0.39, 15.40±0.54 and 20.38±1.01 kg respectively. The pooled milk yield for 90 and 120 days was 158.44±6.25 and 215.58±10.62 liters. The kidding rate was 1.63 under field conditions. Multiple birth was 56.15%. The improvement of 5.61 per cent was observed at 3 months body weight due to use of elite bucks under field condition.

Sirohi Goat Field Unit is located at Livestock Research Station, Vallabhnagar, MPUAandT, Udaipur (Rajasthan). The closing balance of the registered flock was 1023 animals including 820 females. During current year, 491 kids were born out of which 230 were males. Population growth of 84.53% was recorded. The least square means for body weight at birth, 3, 6, 9 and 12 months of ages were 2.30±0.03, 12.43±0.17, 16.00±0.18, 19.04±0.23 and 22.37±0.35 kg, respectively. The overall least square means for milk yield over 90 days, 150 days, lactational yield and lactational length were 54.45±0.1.78, 83.13±2.71, 85.43±2.77 lit and 156.04±0.83 days, respectively. The kidding rate (litter size) was 1.22. During current year 1577 animals were dewormed, ecto-parasiticide was used in 1478 animals. Further, 1504 and 976 animals were vaccinated for ET and PPR, respectively. The overall mortality was 2.62%.

Black Bengal Goat Field Unit is located at WBUAandFS, Kolkata. Socio-economic survey, management practices and housing pattern were studied among adopted villages. The closing balance of Black Bengal goats including all centers was 1426, with a population growth of 56.63%. The body weights of Black Bengal goats at birth, 3, 6 and 9 month of age were 1.17±0.01, 5.28±0.06, 7.82±0.09 and 10.91±0.15 kg, respectively. The average weekly milk yields for first, second and fifth week were 1.58±0.13, 1.66±0.14 and 0.97±0.18 kg respectively. The average daily milk yield is directly proportional to type of birth. Secondly, the amount of total milk yield increased from 6th parity. This breed is highly prolific and having 83.72% multiple birth. The kidding rate was 1.80, which is highest among all the goat breeds of the country. The age and weight at first kidding was 378±2.12 days and 13.52±0.22 kg. After selective breeding almost 99% of total kids born are pure black and few kids are born black with small patches of brown or white. The Socio-economic studies revealed that in the Nadia district of West Bengal state the goat rearing proved more beneficial to the goat keepers having basic knowledge of animal husbandry. The result indicated that the income from the goat farming does not relate with education status of farmers.

Marwari Goat Field Unit is located at Rajasthan Agriculture University, Bikaner. The overall means for body weight at birth, 3, 6 and 12 months of age were 2.58±0.011, 9.68±0.29, 18.33±0.46 and 27.41±0.81 kg respectively. The average milk yield was 38.30±0.27 kg in 30 days, 85.24±1.88 kg in 60 days and 121.15±1.03 kg in 90 days of lactation. The kidding per centage ranged from 68.25 to 82.12

in different location. The twinning per centage ranged from 1.85 to 2.51 in the progenies of elite sires. A total of 20 young bucks of Marwari breed were selected on the basis of body weight and growth rate from the breeding tract of this breed and distributed to the registered breeder of field centers Deshnoke (09), Moondsar (05) and Kalyansar centers (06).

AICRP ON SHEEP

Genetic evaluation and improvement in Muzaffarnagari sheep for body weight and wool yield

Gopal Dass, S D Kharche, A K Das, V K Gupta and Hari Prasad

Muzaffarnagari, the heaviest sheep breed of India, is mainly distributed in Muzaffarnagar, Meerut, Bulandshahar, Saharanpur and Bijnor districts of western Uttar Pradesh and in the some parts of Delhi and Haryana. The breed is known for higher growth rate and good adaptability than other Indian sheep breeds. The Institute is maintaining a flock of pure bred Muzaffarnagari sheep under a "Network Project on Sheep improvement" since 1992. Data on various parameters like growth, meat quality, reproduction, greasy fleece yield recorded in Muzaffarnagari sheep besides survey report and performance of the breed in its home tract. The detailed managemental practices as well as performance of this breed both in farm and field conditions are described below:

Performance at farm:

Genetic evaluation of different traits of interest viz. body weights at birth, 3, 6, 9 and 12 month age and greasy fleece yield, was under taken with Muzaffarnagari sheep with an aim to improve the breed for mutton and wool through selective breeding.

Management practices

Animals were maintained under semi-intensive system of feeding management where they were provided 100-400g ration to growing lambs at various ages, 6 hrs grazing and some dry and green fodders. The concentrate feed provided was consisting of 72% TDN and 16% DCP. Essential ingredients of this ration were maize (15%), barley (20%), ground nut cake (35%), wheat bran (20%), molasses (7%), mineral mixture (1.5%) and salt (1.5%). Ewes of 100 days onwards pregnancy and during lactation and breeding rams during service period were provided additional ration. Dry ewes were fed with only maintenance ration.

Controlled breeding was practiced to improve the managemental efficiency. The ewes were

bred during May-June and October-November followed by lambing in the months of OctoberNovember and March-April, respectively. The lambs were weaned at 2 months of age due to poor milk production as well short lactation period of their dams.

All the sheds and corrals were disinfected frequently with lime. Regular treatment and strict prophylactic measures were practiced for vaccination against Enterotoxaemia, Foot and Mouth Disease, Sheep Pox, H.S., PPR etc. De-worming with different anthelmintics was practiced at pre-monsoon and post monsoon seasons and as and when required. Dipping was done after 15-20 days of each shearing.

Flock statistics

Flock strength of Muzaffarnagari sheep as on 01.04.2007 was 147 sheep (58 male and 89 female, out of witch 67 breeding females) while the closing balance on 31.03.2008 was 223 (61 male and 162 females, out of witch adult females were 110). The addition was due to birth of 100 lambs (47 males and 53 females) and purchase of 27 adult females from breeding tract while the reduction was due to death, culling and sale of animals.

Culling and mortality

The overall culling in 0-3, 3-6 and 6-12 age groups was nil, while in adults it was 12.35%. The overall culling in all age groups was 7.66%. The mortality was recorded to be 1.85, 2.56, 2.25 and 0.42% in the 0-3, 3-6, 6-12 age group and in adults, respectively. The overall culling and mortality was 7.66 and 3.65%. This year the overall mortality and culling was lowest of previous many years. The overall culling on health ground was 1.09%. The replacement rate for the breeding ewes was 28.2%.

Growth performance

The overall least-squares means of body weights of lambs at birth, 3, 6, 9 and 12 month age were 3.26 ± 0.08, 16.90 ± 0.53, 25.92 ± 0.71, 32.75 ± 1.49 and 37.91 ± 1.72 kg, respectively during the year under report. The effect of sex was highly significant ($P < 0.01$) on all body weights. Male lambs gained higher weights as compared to female lambs at all stages. As compared to previous two years the lambs showed highly significant improvement in body weights at all growth stages.

Average daily weight gain (ADG) and meat quality attributes

The average daily weight gain of Muzaffarnagari lambs during 0-3, 3-6, 6-12 and 3-12 months were 151.23 ± 5.45, 99.00 ± 4.12, 63.80 ± 6.27 and 79.03 ± 4.27g under semi-intensive feeding management. Similar to body weights, male lambs showed higher ADG than female lambs for all age groups intervals. Significant improvement was recorded in all ADGs during the year as compared to previous two years. A total of 3 rams maintained under semi-intensive feeding management were slaughtered for evaluating important carcass and non carcass attributes in adult stock. The mean values for carcass traits viz. slaughter age, slaughter weight, empty body weight, carcass weight, dressing per centage (SW), dressing per centage (EBW), fore quarter, hind quarter, loin eye area and total body fat were $1035. \pm 3.38$ days, 54.00 ± 3.21 kg, 48.17 ± 0.54 kg, 27.64 ± 1.76 kg, 50.20 ± 0.40 %, 57.51 ± 0.69%, 15.37 ± 0.96 kg, 12.30 ± 0.84 kg, 14.28 ± 0.13 cm^2 and 2.95 ± 0.51 %. The averages for non-carcass traits viz. blood %, head %, skin % and GI tract % were 4.64 ± 0.14, 6.23 ± 0.09, 9.88 ± 0.06 and 6.10 ± 0.12, respectively.

Reproductive performance

Tupping, lambing on ewes' available basis and lambing on ewes bred basis were respectively 66.7, 61.6, 92.5% and 95.2, 88.9, 93.5% in first and second season. The annual tupping, lambing on available basis and lambing on bred basis were 93.7, 89.3 and 95.6.9. The overall twinning during the year of report was recorded 11.0%. Tupping, lambing and twinning significantly improved during this year as compared to previous many years. The averages for weight at first service, age at first service, age

at first lambing and ewes' weight at lambing were 35.1 kg, 571 days, 726 days and 39.5 kg, respectively.

Greasy fleece yield

The overall least squares means for lambs' 1st and 2nd six monthly and adult annual clips were calculated to be 478.53 ± 39.98, 466.62 ± 20.09 and 1117.68 ± 30.88g, respectively. Sex had highly significant ($P < 0.01$) influence on lambs and adult clip. The males produced significantly higher greasy fleece yield than females in all the clips which might be due to larger surface area for wool growth in males as compared to females.

Genetic and phenotypic parameters

The h^2 estimates of birth, 3, 6, 12 month body weights and first six monthly clip were 0.050 ± 0.061, 0.095 ± 0.072, 0.343 ± 0.127, 0.242 ± 0.105 and 0.450 ± 0.148, respectively. The h^2 estimates of birth and 3 month weights were low and un-reliable might be because of great influence of maternal and other environmental effects on the growth of lambs. All the genetic and phenotypic correlations of body weights and greasy fleece weights were positive. The genetic correlations between and among body weights were relatively lower as compared to phenotypic correlations. The phenotypic correlations of body weight with body weights and fleece yield with body weights decreased with the increase in age.

Selection of breeding rams

The selection of breeding rams was done through selection index comprising of 6 months body weight and first 6 monthly greasy fleece yield of lambs. The selection differential for the traits under selection were 5.2kg and 170g. The selection index value of the selected and un-selected rams were 2.91307 and 2.46968, respectively. Following selection index was used for the ranking of breeding rams:

Index = 0.11029*6-Month body Weight + 0.00176 * First Shearing Wool Yield.

A total of 10 breeding rams were selected for breeding of ewes during the year. All 10 rams were screened for their breeding soundness in terms of semen qualities. Semen collection of rams was carried out in six replicates at weekly intervals. Five rams donated semen in all six trials. One ram for five times, one ram in four trials, one in 3 trials, one in single time and one ram did not ejaculate at all. 7 rams showing better libido and semen qualities in terms of volume of semen, sperm concentration, mass motility, individual motility, live and dead sperm count per centage abnormal sperms, were finally selected and used as breeding rams in the flocks.

Distribution of rams: A total of 17 breeding rams were supplied for breed improvement in farmers flocks through CVO, Animal Husbandry Department, Muzaffarnagar, Uttar Pradesh.

Field survey

Survey was conducted in the breeding tract of Muzaffarnagari sheep during January, 2008 to record important production and morphometric traits and managemental practices of the breed. It was found that breed is generally reared by Pal/Gadaria and Khatik communities belonging to low income group. Flocks are maintained on extensive feeding management system in which animals were grazed for 6-8 hours grazing on the common grazing land or on the road and canal sides with zero supplementary feeding. The animals are taken for grazing at 10.00-11.00 AM and return with sunset after traveling 5-15 KM/day. The sheep owners mentioned that grazing land was on continuous decline due to availability of irrigation facilities and practicing of intensive cropping system. In general, the animals were kept in thatched sheds erected on Kuchcha floor and fenced with thorny/wooden materials and muddy walls. However, some breeders had sheds made up of bricks and cement along with Kuchcha/bricks flooring. Rams and ewes are grazed and housed together and usually one breeding rams is kept in a flock. The lambs below 2 months of age are kept loose

with their dams during nights and left behind at the home during the day time. The lambs are kept in house for about 15 days after birth and thereafter join the flock for grazing. The animals are generally brought to the water points (canal, ponds, tube wells) to drink water twice or thrice a day during the summer season.

In field, the breeding takes place throughout the year as breeding rams always stay with the flock. However, majority of breeding falls in the month of April-June and September-November with lambing in September-November and February-April. Muzaffarnagari sheep is primarily maintained for mutton purpose, although it also produces fleece from 800-1000g/annum. The fleece of this breed is coarse hence not suitable for carpet manufacture. The price of wool varied from Rs. 15-25/kg. The shearing is done two times in a year in the months of October/November and May/June. Some of the farmers shear the animals thrice a year in the month of March, June and September. The shearing is carried out either by farmer's themselves or by their relatives and usually sold locally or to the traders of Panipat city. Sheep are vaccinated against Haemorrhagic septicemia and sheep pox through Department of Animal Husbandry of U.P. state. No de-worming is practiced in farmers' flock. Dipping in ordinary water is done twice a year. The medical cover is generally provided by Veterinary Hospital.

The overall least squares means of body length, height at withers, chest girth and tail length were 25.11 $\pm$1.09, 33.91$\pm$0.64, 36.16$\pm$0.55 and 21.86$\pm$0.52 cm., respectively in the lambs of age group 0-1 month. The corresponding Fig.s of body measurements were 52.28$\pm$0.79, 57.41$\pm$0.75, 56.56$\pm$0.84, 36.94$\pm$0.80 cm in 1-3 month, 56.79 $\pm$0.70, 61.13$\pm$0.47, 63.39$\pm$0.58, 43.66$\pm$0.50 cm in 3-6 month, 66.85 $\pm$0.96, 69.98$\pm$0.94, 70.44$\pm$0.95, 43.17$\pm$0.96 cm in 6-9 month, 81.67 $\pm$0.83, 76.22$\pm$0.78, 79.91$\pm$0.54, 51.98$\pm$0.76 cm in 9-12 month and 82.30 $\pm$0.43, 83.31$\pm$0.39, 84.88$\pm$0.45 and 53.04$\pm$0.47cm in adult animals.

The overall least squares averages for body weights during 0-1, 1-3, 3-6, 6-9, 9-12 month and adults age groups were 6.32 $\pm$0.53, 14.80$\pm$0.44, 19.82$\pm$0.37, 22.75$\pm$0.51, 25.57$\pm$0.48 and 42.33$\pm$0.72 kg., respectively. Sex showed highly significant ($P<0.01$) influence on 1-3, 3-6, 6-9, 9-12 month and adult age groups. Results indicated that males gained about 2.7 (1-3 month), 2.5 (3-6 month), 3.5 (6-9 month), 5.7 (9-12 month) and 12 kg (adult group) more weight than females.