

With Best Compliments From



Prof. (Dr.) M.C. Sharma

Director

CENTRAL INSTITUTE FOR RESEARCH ON GOATS

Makhdoom, Farah-281 122, Mathura (UP) INDIA





CIRG

2008-09

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ANNUAL REPORT



CENTRAL INSTITUTE FOR RESEARCH ON GOATS
Makhdoom, Farah-281 122, Mathura (UP) INDIA





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CIRG

ANNUAL REPORT





PREFACE

It gives me immense pleasure to present the Annual Report 2008-2009 of Central Institute for Research on Goats. This report gives an idea about the achievements and progress of the Institute in the field of research, education and extension education in the field of goat production.

This institute has been working for the millions of poor and landless goat farmers in this country with the objective to improve their economic status. The emphasis has been on the use of multidisciplinary/interdisciplinary approach to further



economise goat farming and value addition of goat products using innovative ideas and thinking. During this period several new initiatives have been taken up which have given new impetus to goat research programmes at the Institute. The basic theme of research has been technological and institutional innovations to enhance the income of poor goat farmers. Generation of technology is not enough. It is important to ensure that available improved technologies

are demonstrated at farmers' doorstep to enhance productivity and income. A concerted approach has been adopted by the Institute in this direction. A dedicated helpline was instituted to answer the goat farmers problems. A large number of pamphlets in easy to understand language were prepared and published besides several books for the farmers were brought out.

Research at this Institute has made possible great improvements in growth, body weight, milk production, and reproduction parameters of Jamunapari, Barbari and Jakhrana. Improved bucks of these goat breeds have been made available to farmers for breed improvement in the farmers field. Emphasis will be given for field recording of productivity of goats breeds on the basis of elite animals supplied by the Institute. DNA fingerprinting and other advanced biotechnological tools have been used for genetic improvement of goats. Work on adaptability of different breeds have been studied in order to elucidate the effect of global environmental change on goat productivity. Work on cryopreservation and enhancement of goat prolificacy using modern biotechnological tools has been initiated. A rapid progress has been achieved in developing various measures to prevent and control the various economically important goat diseases. A herbal drug named 'Alquit' which is highly effective against ticks and mites in animals has been developed and commercialized. A DNA vaccine for brucellosis, an abortion causing disease has been developed. Work on development and characterization of indigenous vaccine and diagnostics for





Johne's disease has made notable achievements. A lot of research work has been done on conservation, storage and utilization of available feeds and fodders as hay, silage, pellets and complete feed block. Area specific mineral mixture has been developed by the Institute scientists and is in the process of commercialization. The process of standardization of snack meat products was achieved. A large number of technologies developed by the Institute scientists have been submitted for patent. Research work taken up on development of supplementary and complete feeds using low grade roughages and agro industrial by products will be further strengthened by taking up processing and storage studies on green fodder, dry fodder and silage etc.

All this and many more achievements in extension, economics and training have strengthened our resolve to make a better

future for goat farmers of this country. Training to goat farmers from all over the country has been undertaken on a very large scale which will go a long way in extension of improved technologies to the ultimate users.

We are grateful for the guidance and support of all our former DGs, DDGs and most recently from Dr. Mangala Rai, Secretary DARE, and DG, ICAR, and Dr. K.M. BujarBaruah, DDG (Animal Sciences), Dr. S. Ayyapan, DDG (Fisheries), Dr. C.S. Prasad, ADG (Animal Nutrition and Physiology) and Chairman and members of QRT, RAC and IMC of the Institute from time to time.

I hope the information presented in this annual report will be useful to all those involved in goat and sheep development programmes in this country.

Prof. (Dr.) M.C.Sharma
Director



CIRG: AN INTRODUCTION

Keeping in view the importance of goats in the national economy and rural development more so for the below poverty line population, a National Goat Research Centre was established on 302 ha land at Makhdoom village near Farah town of Mathura district in Uttar Pradesh about 22 km from Mathura and 32 km from Agra on National Highway No.2 in July 1976. It got the status of a full fledged Institute on July 12, 1979 and named as the Central Institute for Research on Goats incorporating the All India Coordinated Research Project on Goats with the mandate to conduct both applied and fundamental research on all aspects of goat production and product utilization. One of the four Blocks of Laboratory cum Administrative building was constructed in the VIII Plan. All Research Laboratories except Goat Products Technology were accommodated in this 'A' block. The Library, ARIS Cell and Administrative Offices were also accommodated in this building. A Guest House was also constructed during the IX

Plan. The research laboratories were gradually equipped and modernized with instruments, equipments, furniture and other infra-structure facilities. Computerization of the laboratories and offices was completed during the X Plan. The Institute is connected with all modern communication facilities viz. Telephone-0565-2793380, Fax-0565-2793246, E-Mail- cirg@cirg.res.in and Website- www.cirg.res.in

VISION:

“Develop Poor Man’s Cow- the Goat as a Source of Livelihood Security, Poverty Alleviation and Employment Generation for the Smallholders”

MISSION:

The Mission is to enhance and then sustain goat productivity in respect of meat, milk and fibre through Research, Extension and HRD support.

MANDATE:

The Mandate of the Institute is to undertake research, training and extension education programmes for improving milk, meat and fibre production of goats and to develop processing technology of goat products.

OBJECTIVES:

1. To undertake basic and applied research in all disciplines relating to goat production and Products technology.
2. To develop update and standardize area specific package of practices on breeding, feeding, management and prophylactic and curative health cover of goats.
3. To impart National and International trainings in specialized fields of goat research and development.



4. To transfer technologies for improving milk, meat and fibre production and value addition of goat products.
5. To provide referral and consultancy services on goat production and product technologies.

SALIENT RESEARCH ACHIEVEMENTS:

4.1. GENETICS AND BREEDING:

(i) Identification of Gene Pools in Goats

- DNA fingerprinting and Micro-satellite characterization has been carried out in Indian goat breeds.
- Micro-satellite characterization has been carried out in eight Indian goat breeds using 22 markers and best markers for breed differentiation have been reported.
- Sequencing of mitochondrial HVRI region was carried out in 10 goat breeds of different agro-climatic regions.
- Gene diversity in Indian goats and markers usefulness for breed differentiation has been established.
- The neighbour-joining tree of Indian goat breeds along with wild goats was constructed for the first time in India.
- The Indian goats appear to cluster in three different groups viz. Group I- Jamunapari, Sirohi, Marwari,



Changthangi, Chegu, Group II- Jakhrana, Black Bengal, Osmanabadi, Barbari and Kutchi and Group III- Local (non-descript) goats.

- Indicator traits for resistance to gastrointestinal nematodes have been established in Barbari and Jamunapari breeds of goats.



- Milk protein polymorphism has been studied in different Indian goat breeds.

(ii) Improvement in Jamunapari Goats-

- The 12 month body weights have increased from 20.32 kg in 1985 to 29.60 kg in 2003 indicating an improvement of 45.67% over the years.
- The milk yield at 140 days has increased from 105.85 kg in 2001 to 140.98 kg during 2005 indicating an improvement of 33.02%.
- In all 814 elite goats of Jamunapari breed were supplied to different State Govt. / NGOs and farmers for breed improvement during Xth Plan period.
- The overall flock survivability increased from 81.35 in 1985 to 94.60% in 2005.

(iii) Improvement in Barbari Goats-

- The 12 month body weights have increased from 18.52 kg in 1985 to 24.44 kg in 2003 indicating increase of 31.96% over the years.





- The milk yield at 90 days has increased from 42.52 litres in 1985 to 78.82 litres in 2003 indicating about 85.37% increase over the years.
- Kidding rate of 1.6 indicated higher population growth potential in Barbari breed goats.
- The overall flock survivability increased from 75.2 in 1985 to 92.7% in 2005.
- In all 1256 elite animals of Barbari goats were supplied to different agencies viz. State Govts., NGOs and goat farmers for breed improvement during Xth Plan period.

(iv) Improvement and Conservation of Jamunapari Goats in their Breeding Tract-

- The improvement of Jamunapari goats in their natural habitat was started at Chakarnagar in Etawah district of U.P. with active support of farmers to restore the pride of Jamunapari goat.
- The increasing trend in body weight from base population is observed indicating use of superior breeding bucks by villagers over the years. There is no decline in performance of the village flocks over the years. The fertility and viability is increasing year after year.

(v) Improvement in Muzaffarnagari Sheep-

- An improvement of 7.3% in adult body weights was recorded during Xth Plan period.
- The 6 and 12 month body weights increased from 18.7 and 23.9 kg in 1977 to 25.1 and 32.7 kg in 2004 showing an improvement of 34.2 and 37.2%, respectively.
- Under intensive feeding the body weights at 6 months age increased from 25.5 kg in 1977 to 33.7 kg in 2004 indicating an improvement of 32.1%.
- First and Second six monthly wool yield was improved by 76.8 and 57.1% respectively.
- The over all flock survivability has improved from 78.0 in 1977 to 97.4% in 2004.

4.2 NUTRITION, FEED RESOURCE AND PRODUCT TECHNOLOGY:

(i) Development of Economic Feeding Systems for Goats-

- Several fodder tree leaves and cultivated leguminous fodders based complete feeds for different categories of goats as mesh, pellets and blocks have been developed for economic goat meat and milk production.
- Supplementary feeding requirements of different categories of goats during different physiological stages have been worked out.
- Entolobium tree leaves as defaunation agent improved feed intake, nutrient utilization and growth rate in goats.
- Subabool (*Leucaena leucocephala*) leaf meal could be incorporated up to 30% in the complete feeds for goats without any deleterious effect.
- Supplementation of 15 g common salt and 15 g mineral mixture daily in the



feed of the adult goats improved protein and energy availability by about 16 %.

- Milk replacers were developed and tested successfully in pre-weaning Barbari kids.
- Two and three-tier silvi-pasture models using several perennial grasses, legumes, fodder shrubs and trees were developed and evaluated for goats.

(ii) Feed Technology:

- A low cost Feed Pellet Making machine was developed for preparation of complete goat feeds in the form of pellets.
- A Complete Feed Block making machine was developed, tested and used for making CFBs for different categories of goats.

(iii) Green House Technology:

- Technology for drying of rainy season



herbage in the form of hay under Poly houses was perfected. Hay racks for drying the herbage have also been developed.

(iv) GOAT PRODUCTS TECHNOLOGY:

(i) Carcass and Meat Quality Evaluation-

- Live animal traits, carcass and non-carcass component yield, cutability, carcass composition, fat partitioning and meat composition of goat carcasses of

different breeds and age groups have been studied.

- Effects of age, system of feeding and management on quantity and quality of meat production have been studied.

(ii) Goat Meat Products-

- Processing techniques for manufacture of value added products from spent goat meat have been developed and Recipes viz. pickles, sausages, cubes, shami kebabs, samosas, patties, roll slices, cutlets, croquettes, meat balls, warm and serve meat curries and chevonettes have been standardized.
- The quality attributes of value added meat products and their shelf-life have been evaluated.

(iii) Goat Milk-

- Effects of breed, season, time of milking, parity and stage of lactation on major milk constituents and Paneer yield have been investigated.
- Keeping quality of Barbari and Jamunapari goat milk during summer, winter and rainy seasons at room temperature have been studied.

(iv) Goat Milk Products-

- Processing techniques for preparation of Paneer, a value added product using different coagulants have been developed and standardized.



- Quality and shelf-life of Khoa, Shrikhand, Channa, Mozzarella cheese, Whey drink and Dahi (curd) have been studied.

4.3 PHYSIOLOGY, REPRODUCTION AND MANAGEMENT:

(i) Conservation of Energy and Climatic Adaptation-

- Benefits of predominantly black/dark coat color commonly found in desert goats through energy economy have been worked out.
- The breed variation in sustaining water deprivation and effect on field application has been worked out.
- Physiologically Sirohi goats are best suited to combat the thermal stress in semi-arid climate.
- The package of best management practices under both intensive and semi-intensive system has been developed.

(ii) Augmentation in Reproduction-

- A modified freezing protocol has been developed for ex-situ conservation of buck semen.
- The post-thaw motility has increased from 55 to more than 60%.
- Optimum number of live spermatozoa required per inseminating dose has been perfected.
- Post-thaw motility was found better in straws having lower sperm concentration of 50-100 m spermatozoa as compared to higher concentration of 150-200 m spermatozoa.
- Fertility rate with frozen semen using deep cervical technique ranged from 25-48%.
- Technologies have been developed to preserve buck semen as liquid and as frozen and fertility trials have been conducted.





(iii) Embryo Biotechnology-

- Good quality embryos were successfully collected through non -surgical technique.
- Technologies have been perfected for collection and transfer of embryos for quick multiplication of superior goat germplasm.
- The conception rate in recipient does through surgical transfer varied from 20 to 40%.
- Thirty seven kids were born out of intra-cervical embryo transfer technique.
- Laparoscopic technique could be applied for oocyte recovery and application of collagenase enzyme proved to be beneficial in oocyte recovery.
- Caprine embryos could be successfully frozen at 4-12°C by vitrification technique.
- An eight cell in-vitro fertilized (IVF) embryo was transferred to a local goat and a healthy kid was born of a surrogate mother for the first time in the Country.

(iv) Housing Requirements-

- Housing requirements for different categories of goats have been determined and shelter management techniques standardized.

(v) Feeding and Watering Devices-

- Sets of 11 Feeding and Watering devices suitable for Goat and Sheep Farms have been developed and/or modified. This technology has been adopted by several Commercial Goat Farmers in different parts of the country.

4.4 GOAT HEALTH:

(i) Microbiology-

- PCR based diagnosis directly from clinical material, serum and milk-ELISA diagnostic methodology has been developed.

- Several isolates of Mycobacterium Avium Paratuberculosis (MAP) have been characterized in organized and farmer flocks.

BRUCHECK: A Dot-ELISA kit for detection of brucellosis in goats

- A comb based dot-ELISA kit and PCR based test has been developed for diagnosis of *Brucella melitensis* infection in goats and sheep. The dimension of caprine Brucellosis disease has been studied in organized and unorganized farms.
- Development of DNA based vaccine against *Brucella melitensis* is underway.
- A latex agglutination test for quick and spot diagnosis of *M. Capri* infection has been developed.
- Pathogenic *E. coli* strains were isolated from the fecal samples and heart blood samples at autopsy of kids died of diarrhea. About 200 doses of experimental polyvalent vaccine, incorporating six strains of various serotypes of entero-pathogenic *E.coli*, were used successfully in pregnant does to control the kid mortality.
- Outbreaks of PPR were investigated throughout the country. The disease appears to be endemic in goats and sheep in India and the outbreaks seem to spread steadily now in young animals all over with high mortality of 38.75 to 48.90% and morbidity of 19.34 to 46.66%.

(ii) Medicine-

- Epidemiology of important goat diseases like PPR, Goat Pox, Contagious Ecthyma, FMD, Haemonchosis, Colibacillosis was studied in changing climatic conditions in organized farms.
- Several medicinal plants were evaluated for the control of Haemonchosis in goats.



- Behaviour of blood biochemistry and Complete Blood Count (CBC) was studied in goat diseases for clinical diagnosis.
- A herbal drug against Ectoparasites with the trade name "Alquit" has been developed, validated and found to be very effective.

(iii) Veterinary Public Health-

- Baseline information on epidemics of goat diseases at National level has been analyzed. Major diseases recorded were PPR, FMD, E.coli infection, Contagious ecthyma, Goat Pox, gangrenous mastitis, Enterotoxaemia, Pasteurellosis etc.

(iv) Parasitology-

- Monensin @ 40 mg per kid/day in premixed concentrate mixture was found to be effective in coccidiosis.
- The basic epidemiological information under field conditions on the common parasitic infestation and incidence of mortality has been studied.

4.5 EXTENSION EDUCATION AND SOCIO-ECONOMICS:

- Goat rearing has been found to be profitable under semi-intensive and

extensive system of management under field conditions giving net profit of 0.76 rupee per rupee of total input cost with a net income of Rs. 1300 to Rs. 1800 per goat/annum.

- Several Extension Education Models in adopted villages and off and on-Campus training programmes have been studied. A Distant Extension Method for Commercial goat farming has also been studied.
- Mortality and morbidity losses in goats under field conditions have been estimated to be Rs. 11,720 million/annum at the National level and Prophylaxis measures may result in a net saving of Rs. 5,144 million/annum.
- Basic information on goat production systems, marketing and ITK has been collected.
- The constraint analysis of BPL farmers revealed that non-availability of medicines, vaccines, treatment, grazing, credit, proper market and feeds for goats were the major handicaps in successful goat rearing.
- The constraints in organization of Goat Cooperative Societies have also been studied.





- About 750 commercial goat farmers of 11 States were surveyed. About 25% farmers were undertaking goat rearing as their primary source of income and were fully dependent on it.
- The role of middlemen in goat marketing and exploitation of goat farmers by them was studied.
- About 52 ethno-veterinary herbal combinations were used by the goat farmers for treatment of 15 common diseases/ ailments of goats mostly due to resource crunch.

4.6 ARIS:

- The Agriculture Research Information System (ARIS) Cell was created during 1996. CIRG has established the first functional LAN of National Agriculture Research System of India. Subsequently, web site of the Institute was launched from the server located at CIRG. Thus, CIRG web site <http://www.cirg.res.in> was the first web site launched from the own server and on OSS/FS software. The Institute has also launched Hindi version of the web site.
- The web-based email was created making the email of CIRG accessible from all over the world on Internet. The email conferencing systems generally known as Mailing Lists of List servers were created on 7 aspects of agriculture.



- The ARIS Cell organized 4 National and one International training programme on Sustainable and affordable information system development using OSS/FS and Development of Internet and intranet using Linux Operating system. The Unit is advising Institutions and Universities in setting up their Internet

Human Resource Development

The Institute is offering Ph.D. level research program in collaboration with Dr. B.R.Ambedkar University, Agra. In addition to specialized training programmes for professionals and veterinarians in various areas of scientific goat rearing, the Institute regularly organizes National Training programmes on Commercial goat farming for 10 days duration every quarter of the year, for farmers and entrepreneurs.



EXECUTIVE SUMMARY

Although goats can thrive in all environments, whether temperate, tropical, arid, humid, semi humid, hot or cold, the majority (67%) of the world's goats lives in Africa and Asia. Developing countries with poor economies have more goats (94%) than developed industrialized nations, and most are reared for meat, milk and fiber. Other by products, such as hides, bone and hair are also utilized. Goats' milk is considered wholesome and easy to digest, and its fat and protein contents are similar to those of human milk, making it ideal for human nutrition. It contains smaller fat globules than cow's milk (3.5 μm compared to 4.5 μm) and has different protein polymorphs and high levels of short-chain and polyunsaturated fatty acids.

Goats are an important species of livestock for the poor farmers of India. The goats are widely distributed in all the agro-ecological zones of India. Goats can be profitably raised with low investment under the most extensive to intensive system of management depending on eco-social environment. Goats are known to provide nutrition to the people below the poverty line by providing milk and meat. The socio-economic value of the goat rearing is evident from the sharp rise in goat population during the post-independence period from 47.2 million in 1951-1952 to 125.46 million in 2007. Goats survive better

under extreme agro-climatic conditions and therefore goat keeping is a sort of insurance against effects of drought, famine, disasters and other such calamities.

Goats have been frequently referred to as Poor Man's Cow because of their usefulness to the poor and landless. Goat in India produce 521 TMT of meat, 3790 TMT of milk, 129.60 TMT of fresh skins and 0.041 TMT pashmina.

The per capita availability of the milk in India is about 221 g. per day, but this is still very low as compared to developed nations or the world average of 285 g per day. Goats can contribute significantly in increasing the per capita availability of milk by the rural poor.

Goat are also an important source of valuable pashmina, skin and manure. Its' skin is a valuable by-product for leather industry and goat manure is rich in nitrogen, phosphorus and trace minerals. Goats generate about 4.2%





rural employment per year.

A national planning for further improvement in goat production and its value added products for international acceptability is

essential. Rapid progress has been achieved in the field of Goat Genetics and Breeding, Nutrition, Management, Physiology, Reproduction, Health, Products Technology, Socio-economics and Extension Education. The impact of this knowledge is becoming very useful for the economic development of the farmers and farm women, and lately, commercial goat farming is coming up in different parts of the country.

The Institute has continued to support need based research and development programme, demonstration activities, technology transfer, product development and conservation of natural genetic resources.

Genetics Improvement Programmes

The major emphasis has been mainly on selective breeding for increasing productivity in goats, conservation in home tract and gene marker studies for enhancing selection decision. Selective breeding of Jamunapari and Barbari goats has caused promising genetic progress in body growth over the years. The criterion for selection of superior bucks was on the basis of index computed by taking account of 9 months body weight and 90 days milk yield of their dams.

Top ranking bucks were used for producing superior progeny. Mean body weights of the kids at birth, 3, 6, 9 and 12 months of age were 3.31 ± 0.04 , 10.60 ± 0.11 , 11.68 ± 0.12 , 15.04 ± 0.70 and 18.59 ± 0.27 kg in Jamunapari and 1.79 ± 0.01 , 7.63 ± 0.05 , 12.06 ± 0.07 , 16.42 ± 0.10

and 20.23 ± 0.15 kg in Barbari, respectively during the period under report. Average milk yield in the Jamunapari at 90 days and 140 days was 75.92 ± 9.83 and 120.87 ± 4.43 kg respectively during the year. The average lactation length in Jamunapari was 154.21 ± 3.18 days. Body weight at birth, 3, 6, 9 and 12 months age averaged 2.69 ± 0.06 , 8.82 ± 0.20 , 11.70 ± 0.28 , 15.54 ± 0.59 and 21.89 ± 0.71 kg, respectively in Jakhkana kids during the reported period. The elite germplasm of Jamunapari, Barbari, and Jakhkana breeds numbering 72,247 and 26 respectively was supplied to the farmers, SAUs, NGOs and other research institutions for breed improvement and conservation under field conditions. Genetic variations in MyoD family genes, which are responsible for growth and meat quality in Barbari, Jamunapari and Black Bengal goats were analyzed. A NAIP project on Development of Goat based Integrated Farming System in Bundelkhand Region of U.P. has been initiated.

Physiology, Reproduction and Shelter Management Programme

Studies on refinement of frozen semen technology were continued and efforts were made for strengthening of goat semen bank. Extender modified with Antioxidants (reduced glutathione, Ascorbic acid and a-





Tocopherol) shown better motility (initial, equilibration and post thaw) among all the levels tested. Extender modified with Glycerol + DMSO in (3:5), Glycerol + Propylene glycol in (4:2) and Propylene glycol + DMSO in (1:4) showed better motility (initial, equilibration and post thaw) among all the combinations tested. Seminal characteristics and freezability of Sanganmeri Breed of goats studied and reported. Progesterone impregnated sponges were prepared and tested for their retention and synchronization of oestrus in goats. The kidding rate following administration of 400 IU eCG, 200 IU eCG on day 17th of oestrous cycle and in control goats were 40%, 16.66% and 25%, respectively. The overall estrus response and conception rate in 90 days post partum and >90 post partum groups following use of intra vaginal passaries were 80.00% & 100.00% and 75.00% & 77.77%, respectively. The average recovery rate of oocytes using follicular puncture was 2.07 per ovary. The cleavage rate of goat oocytes on morphological evaluation was 26.65%. The oocytes were cultured in different culture media (TCM-199, SOF and KOSM) for embryo development. The overall percentage of 2-cell, 4-cell, 16-cell and morula were 31.54%, 27.10%, 16.82%, 15.65% and 12.38%, respectively. Adaptability studies on goat breeds was carried out. Recording of weather data was carried out throughout the year and it was found that Maximum temp. of 48.0 °C was recorded on 01.05.08 Minimum Temp of 1.0 °C was recorded on 01.01.09. Annual Rainfall during the year was 450 mm.

A winter school on "Recent Advances in Improvement in Productive and Reproductive Efficiency of Goats through Physiological and Nutritional Interventions" was organized in PR&SM division of CIRG, Makhdoom for professionals from 25th November, 2007 to 15th December 2008. The

course curriculum covered theory lectures, practicals and demonstrations including study tours. Programme was sponsored by ICAR, New Delhi.

Nutrition and Products Technology Programmes

Goats are mainly reared through grazing by rural poor who do not have pasture land or agricultural holding and second category is of commercial goat farmers, which are very less in number. Common problems encountered with regards to nutrition of these animals are, the shortage of feeds and fodders, most of the feed available for goats are of poor quality and ignorance of the goat farmers about the balance feeding of their animals. Secondly, processing of milk and meat of goats is of prime importance for its value addition, thus development of appropriate processing technologies are of great significance. Incorporation of goat faeces reduced duration of vermin-compost maturity. Productivity of fodder under mixed cropping system is higher than the sole cropping under agro-forestry system. Complete feed pellet with C:R (40 : 60) resulted in economic growth (80 gm/day) in finisher kids. Cotton seed and linseed cakes with 50:50 and 30:70 ratios in the ration performed better in terms of pregnancy performance and kids growth. Fat content in milk was reported higher during the rainy





season. Consumption of goat milk by HIV+ patients resulted in improved immunity status. Supplementation of strategically added major and micro-nutrients resulted in higher growth rate in goats under field conditions. No significant difference in slaughter weight between single and twin born Barbari kids but twin kids have lower slaughter weight. No difference was found in meat quality between single and twin born. Fresh goat spleen a valuable source of protein and mineral and use of spleen reduces the formulation cost and improves nutritive value of meat products. Spent goat meat can be successfully utilized by mixing meat of young goat meat product. Such goat meat products are highly acceptable to the consumer.

Goat Health Programmes

Goat health programmes are directed towards development of various measures to prevent and control the various economically important goat diseases. Monitoring and surveillance of important goat diseases in India is being done through questionnaires and personal visits to farmers' flocks and AHDs. For herbal therapy of caprine coccidiosis, 8 plants were selected for in-vitro and in-vivo trials against different stages of coccidia. In-vitro trials, *Aloe vera* extract was

found to be promising. Diarrhoea in young kids is a serious problem. Clinical trails of three prototypes based on synergistic activity were conducted against clinical cases of diarrhoea of goats and finally two prototypes with three plant combinations were selected for drug development. *Brucella* isolates were isolated and morphological, biochemical and molecular characterization done for sero epidemiology. Trials of the indigenous inactivated 'Johne's disease vaccine' were further conducted in goats and sheep in different regions of the country and the vaccine has shown encouraging results in terms of prevention of JD.

Extension Education and Socio-Economics Programmes

Technologies developed by the Institute were transferred and evaluated at the farmer's door through the multi-disciplinary Project. The Project has resulted in proportionately higher share of Barbari goats in the adopted villages, lower mortality and morbidity and adoption of better marketing strategy. Work on adoption of technologies and development of tests, scales to measure knowledge and attitude of the goat farmers towards selected goat husbandry practices was carried out. Assessment of the impact of the improved technologies and emerging market conditions on goat production was carried out.





A total of four National Training Programmes on different aspects of scientific and commercial goat production were organized for the farmers, goat keepers, entrepreneurs, extension workers and scientists sponsored by several State Animal Husbandry Departments, State Agricultural Universities, Directorate of Extension, Non-Governmental Organizations, Self Help Groups etc. Other training programmes as per the demand of State governments/NGOs were also organized, mainly sponsored by IFFCO Foundation, New Delhi, Directorate of Extension, Ministry of Agriculture, New Delhi and DASP-II Directorate of Animal Husbandry, Lucknow.

The Institute participated and put up exhibition at different places (ILDEX, New Delhi, Lupin foundation, Rajasthan, G.B. Pant University, Pantnagar, CSWRI, Avikanagar, NRC on rapeseed and mustard, Bharatpur, Veterinar University, Mathura, IARI, New Delhi, IVRI, Izatnagar) in the country for demonstration of technologies developed by the Institute.



and international agencies. A total of 522 entrepreneurs, goat farmers, professionals, students and representatives of development agencies benefited through advisory and consultancy services.

Training Programmes and other activities

Four National training programmes on "Commercial goat farming" was organized during the year for the development and encouragement of goat industry on commercial lines in the country. The Institute organized a National Seminar on Rural India Developmental Alternatives - Sectoral convergence for livelihood security on 16-18th Jan, 2009.

The Institute also offers training programmes on semen freezing, AI and female reproduction, goat farm management, feeding and feed processing for economic



A total of 15 Ph.D and 6 M. Sc. students were admitted during the year to do their research work under the guidance of scientists of the Institute.

Consultancy services on goat production and utilization were provided to several national





goat production, goat diseases, their treatment and control and meat and milk evaluation and processing technology. It is expected that training and consultancy on goat production and management will be useful to the farmers, farm women, educated youth, entrepreneurs extension workers and subject matter specialists for economic upliftment of rural people and establishment of goat industry, and increasing the goat meat production and goat productivity in the country.

Several bulletins and three issues of Institute newsletter "Ajamukh" and "Goat News" were published and distributed.

The library of the Institute procured several publications to keep the scientists upto date with the latest knowledge in their field of specialization.

The Hindi section organised several programmes for the promotion of Hindi among the Institute workers.



कार्यकारी सारांश

केन्द्रीय बकरी अनुसंधान संस्थान की स्थापना वर्ष 1979 में बकरी पालन की विभिन्न विधाओं में मौलिक, आधारभूत एवं जनोपयोगी अनुसंधान हेतु हुई। निदेशक, संस्थान के सर्वोच्च अधिकारी हैं जो अनुसंधान सलाहकार समिति एवं संस्थान प्रबन्धन समिति की सलाह एवं मार्गदर्शन से कार्य करते हैं। संस्थान में वर्तमान में निदेशक सहित 38 वैज्ञानिक, 72 तकनीशियन, 39 प्रशासनिक एवं वित्त तथा 100 सहायक कर्मचारी हैं। वर्ष 2008-09 में संस्थान को ₹0 195.00 लाख योजना मद व ₹0 783.00 लाख गैर-योजना मद में आवंटित हुई। इस राशि में से संस्थान द्वारा ₹0 131.01 लाख योजना मद व ₹0 710.67 लाख गैर-योजना मद में व्यय किये गये।

बकरियों की संख्या वर्तमान दर से बढ़ती रही तो वर्ष 2010 तक यह लगभग 13 करोड़ तक पहुंच जायेगी। बकरी प्रतिवर्ष अपने विभिन्न उत्पादों जैसे मांस (52.10 करोड़ कि०ग्रा०), दूध (379.0 करोड़ कि०ग्रा०), खाल (13.0 करोड़ कि०ग्रा०), पश्मीना (41 मी०टन) व खाद (90 हजार मी० टन) द्वारा देश की अर्थव्यवस्था में महत्वपूर्ण योगदान करती है। बकरी की



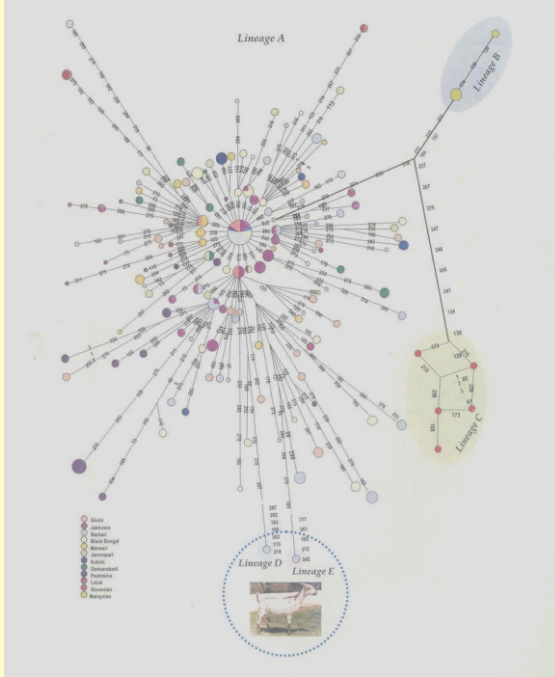
उत्पादकता बढ़ाने के उद्देश्य से संस्थान बहुआयामी शोध, प्रशिक्षण एवं प्रसार कार्य में निरन्तररूप से संलग्न है। इसी कड़ी में संस्थान ने विगत वर्ष में निम्न उत्कर्ष शोध व प्रसार कार्य को सम्पादित एवं प्रतिपादित किया है।

बकरियों की विभिन्न नस्लों के विकास के लिए चयनधर्मी प्रक्रिया का प्रयोग अत्यन्त लाभकारी सिद्ध हुआ है। उत्कृष्ट प्रजनक नर हेतु, 9 माह



पर शरीर भार एवं 90 दिन में उसकी माता का दुग्ध उत्पादन चयन प्रक्रिया का मुख्य हिस्सा रहे। जन्म के समय, 3, 6, 9 व 12 माह की आयु पर जमुनापारी नस्ल में 3.28 ± 0.03 , 11.99 ± 0.14 , 16.41 ± 0.22 , 21.54 ± 0.38 एवं 27.06 ± 0.38 कि०ग्रा० शरीर भार प्राप्त हुआ। बरबरी नस्ल में यह आंकड़ा 1.87 ± 0.10 , 6.40 ± 0.10 , 6.40 ± 0.10 , 12.45 ± 0.09 , 17.66 ± 0.11 एवं 22.33 ± 0.33 कि०ग्रा० का था। जमुनापारी एवं बरबरी नस्ल में 90 दिन का औसत दुग्ध उत्पादन 103.1 ± 2.0 एवं 58.81 ± 1.52 लीटर रहा। इन दोनों नस्लों में





दुग्ध अन्तराल 169.9 ± 1.52 एवं 109.80 ± 1.32 दिन का देखा गया। जखराना नस्ल में जन्म 3, 6, 9 व 12 माह में शरीर भार क्रमश 2.78 ± 0.09 , 9.98 ± 0.36 , 14.97 ± 1.05 , 17.89 ± 1.00 व 22.52 ± 1.55 कि०ग्रा० था। इस नस्ल में 90 एवं 150 दिन का दुग्ध उत्पादन क्रमश: 109.87 ± 3.99 एवं 145.79 ± 4.75 लीटर पाया गया। बकरियों में वृद्धि दर एवं मांस की गुणवत्ता से सम्बन्धित जीन्स में आनुवांशिक विविधता का विश्लेषण किया गया।



संस्थान द्वारा चयनधर्मी प्रक्रिया से उत्पादित जमुनापारी, बरबरी एवं जखराना नस्ल के कुल 254 उन्नयत नर एवं मादा पशुओं को ग्रामीण एवं अन्य क्षेत्रों में नस्ल सुधार हेतु बकरी पालकों, गैर सरकारी संगठनों, व्यवसायिक बकरी पालकों, कृषि विश्वविद्यालयों एवं शोध संस्थानों को दिया गया। संस्थान द्वारा उत्तर प्रदेश के बुन्देलखण्ड में बकरी पालन आधारित समन्वित कृषि प्रणाली विकसित करने हेतु एन०ए०आई०पी० प्रदत्त शोध परियोजना प्रारम्भ की गयी है।

बकरी में हिमीकृत वीर्य तकनीक को अधिक प्रभावी बनाने के उद्देश्य से प्रयोग एवं अध्ययन किये गये एवं बकरी वीर्य बैंक के सुदृढीकरण हेतु प्रयास किये गये। एंटी आकसीटेन्ट की बकरी वीर्य हिमीकरण में अच्छा प्रभाव पाया गया। बकरी में ऋतुकाल के समकालीकरण हेतु स्थानीय प्रोजेस्टरान वाले स्पोंज से अच्छे परिणाम प्राप्त हुए।

बकरियों में अनुकूलन व बकरी निष्प्रयोज्य प्रबन्धन पर अध्ययन किये गये। बरबरी बकरों का सघन पद्धति के अन्तर्गत व सिरोही बकरों का अर्ध-सघन पद्धति के अन्तर्गत अनुकूलन अधिक अच्छा रहा।

बकरी के चारे के संचयन एवं संवर्धन हेतु संस्थान द्वारा शोध प्रयास किये जा रहे हैं।

बकरी के लिये तैयार किये गये गोलीनुमा पूर्णआहार को खिलाने से बच्चों में प्रतिदिन अधिक वृद्धि (80 ग्राम) पाई गयी।

कपास (50:50) तथा अलसी की खली (30:70) युक्त आहार खिलाने से गाभिन बकरियों तथा बच्चों में अधिक वृद्धि पाई गई।

बकरियों की मैगनी से वर्मी कम्पोस्ट बनाने में सफलता प्राप्त की। मैगनी को डालने से वर्मी कम्पोस्ट जल्दी तैयार हुआ।



संस्थान द्वारा विकसित स्थान विशिष्ट खनिज लवण मिश्रण का पशुओं में प्रयोग अत्यधिक लाभकारी पाया गया।

महीना, मौसम व दुग्ध अवस्था का बकरी दूध संगठन पर प्रभाव का आंकलन किया गया। दूध में वसा की मात्रा वर्षा ऋतु में तुलनात्मकरूप से अधिक पाई गई।

बकरी मांस की गुणवत्ता पर अध्ययन में पाया गया कि बारवरी के एक अथवा दो बच्चों के वर्ध के समय के भार में कोई अन्तर नहीं पाया गया। बकरी मांस से कई नये उत्पाद बनाये गये एवं उनका सफल परीक्षण किया गया।

देश में बकरी में विभिन्न बीमारियों की स्थिति पर संस्थान द्वारा लगातार सर्वेक्षण इस वर्ष भी

जारी रहा। बकरी में कोक्सीडियोसिस के हर्बल उपचार के उद्देश्य से 8 पौधों की छंटनी की गयी। इन-विट्रो परीक्षणों के दौरान ऐलू वीरा का सत कोक्सीडियोसिस के खिलाफ अत्यधिक प्रभावी पया गया। मेमनों में दस्तों के उपचार हेतु तैयार किये गये 3 पादप सतों का परीक्षण किया गया। इनमें से 2 प्रोटोटाइपस का सम्भावित दस्त विरोधी हर्बल दवा बनाने हेतु चयन कर लिया गया। बकरी में ब्रूसेलोसिस रोग के कारक ब्रूसेला की पहचान आणविक स्तर पर की गयी। संस्थान द्वारा विकसित जोहनीस रोग के टीके के मूल्यांकन हेतु इसका बकरी व भेड़ पर देश के विभिन्न क्षेत्रों में परीक्षण किया गया। जिसके अच्छे परिणाम प्राप्त हुए।



संस्थान द्वारा विकसित नवीन तकनीकों का मूल्यांकन एवं स्थानान्तरण सुचारु एवं प्रभावीरूप से एक विशेष परियोजना के अन्तर्गत किया गया। इसके परिणामस्वरूप गोद लिये गाँवों में बरबरी बकरियों का प्रतिशत बढ़ा व बकरी मृत्यु दर कम हुई। उन्नत तकनीकों का अंगीकरण व ज्ञान व अभिवृत्ति को मापने हेतु टैस्ट व पैमानों का विकास एवं उन्नत तकनीकों व उभरती बाजार



स्थितियों का बकरी उत्पादन पर प्रभाव आदि पर अध्ययन जारी रहे। उन्नत बकरी पालन के ज्ञान को अधिक से अधिक लोगों तक पहुंचाने के लिए संस्थान द्वारा गतवर्ष में 4 राष्ट्रीय प्रशिक्षण कार्यक्रम आयोजित किये गये। संस्थान द्वारा वैज्ञानिकों के लिए 1 माह के एक प्रशिक्षण कार्यक्रम का आयोजन भी किया गया। इस वर्ष 15 पी0एच-डी0 एवं 6एम0एस-सी0 के विद्यार्थियों को संस्थान में प्रवेश दिया गया। देश-विदेश के विभिन्न भागों से आये कृषकों, गैर सरकारी संगठनों के प्रतिनिधियों, व्यावसायिक बकरी पालकों एवं छात्रों के लिए परामर्श की व्यवस्था की गई। वर्ष भर में कुल 552 सम्बन्धित व्यक्तियों व संस्थाओं को परामर्श सेवा दी गई। यह

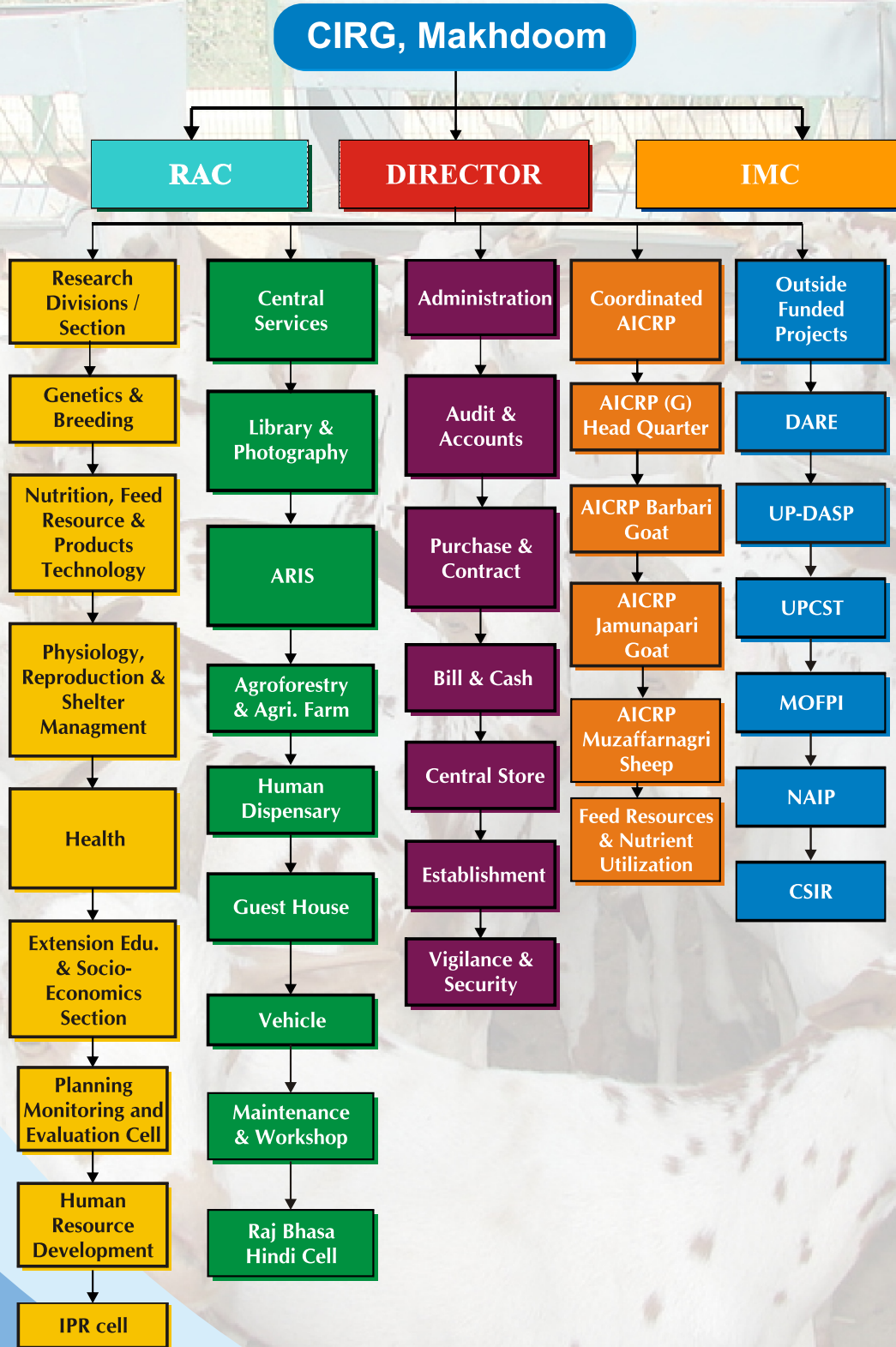


परामर्श विभिन्न वर्गों के लिए अत्यन्त लाभकारी सिद्ध हुआ।





ORGANIZATIONAL SETUP



STAFF STRENGTH

Category	No. of post sanctioned	No. of post filled
RMP	1	1
Scientific	56	34
Administrative including Non-Min. Staff	40	39
Technical	72	72
Supporting	104	103
Temporary Status	113	113
Total	386	362

FINANCIAL POSITION

(On March 31, 2009) (Rs. in Lakhs)

Head	Plan		Non Plan	
	Allocation	Expenditure	Allocation	Expenditure
1. Establishment Charges	0.00	0.00	782.50	772.74
2. Wages	0.00	0.00	140.00	139.93
3. OTA	0.00	0.00	0.60	0.57
4. T.A.	2.00	2.00	3.50	3.50
5. HRD	2.00	1.59	0.00	0.00
6. Other charges including equipments	258.00	257.92	173.00	172.64
7. Works	12.00	11.83	83.50	83.42
8. Land Development	0.00	0.00	0.00	0.00
Total	275.00	274.34	1183.10	1172.80

