वार्षिक प्रतिवेदन

Annual Report

2007-08

CIRG

CIRG 1979 Mathura

भाकृअनुप ICAR

CENTRAL INSTITUTE FOR RESEARCH ON GOATS

MAKHDOOM, P.O. FARAH - 281 122, MATHURA (UP) INDIA

CIRG

ANNUAL REPORT 2007-08

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PREFACE

Goats are very important livestock species in the rural economy of the country. They are widely distributed in all the agro-ecological zones of India. Goat is a friend of the weakest section of society and ray of hope in the areas where agriculture is not economically viable and ecologically sustainable. Goats are maintaining nutritional status of the lower strata of people by providing milk and meat. Goats can profitably be raised with low investment under intensive to the most extensive forms of nomadic grazing. The socio-economic importance of goat rearing is evident from the sharp increase in their population during the post independence period from 47.2 million in 1951-1952 to about 125 million presently. Annually, India produces 521 million kg of meat, 3790 million kg of milk, 130 million kg of skins, 30 metric tones of pashmina and about 90,000 metric tones of manure from goats.

The productivity of goats is low because they are mainly reared on scrub vegetation of community grazing land under most extensive system. Owing to their good economic potential the goat rearing under intensive and semi-intensive systems for commercial production is also gaining momentum. The country has to gear up to produce, process and market quality animals and their products to compete globally using latest technologies. The Central Institute for Research on Goats, Makhdoom is committed to conduct basic and applied research on all aspects of goat production and utilization. It gives me immense pleasure in presenting the Annual Report 2007-08 of the Institute containing salient research achievements made and training, extension and consultancy services provided by the Institute during the year. The Institute has developed, refined and validated a number of useful technologies for commercial goat production in the country. Genetic improvement of Jamunapari, Barbari and Jakhrana goats at the Institute and Sirohi, Black Bengal, Marwari, Surti, Sangamneri, Ganjam and Malabari breeds under the AICRP was continued. The Goat Semen Bank was further strengthened and studies on refinement of frozen semen technology and adaptability of goats were continued. Studies on adaptability in Barbari and Sirohi bucks and goat-waste management have been initiated. The area specific mineral mixture developed

by the Institute was tested and validated under field conditions. Monitoring and surveillance of goat diseases was continued. The successful studies on development of herbal drugs and control of Johne's disease were undertaken. The Institute was awarded a mega project on 'Goat Husbandry based Integrated Approach for Livelihood Security in Disadvantaged districts of Bundelkhand Region' under the World Bank funded National Agricultural Innovation Project of the ICAR. Technologies developed by the Institute were transferred and evaluated at the farmer's door through a multi-disciplinary research project. A large number of elite breeding males and females of different goat breeds were provided to the State Animal Husbandry Departments and other major stakeholders for breed improvement. The institute imparted training on commercial goat farming to over 200 progressive farmers and entrepreneurs during the year. The human resource development and educational programmes offered by the Institute progressed successfully and number of Ph.D. and M.Sc. dissertations were completed during the year. The Institute in collaboration with the Indian Society for Sheep and Goat Production and Utilization organized National Goat Fair cum Scientists-Entrepreneurs- Farmers Interactive Meet. In total, over 800 National and International visitors visited the Institute during the year. The publication of Hindi News Letter 'Ajamukh' was continued and a new News Letter 'Goat News' in English was also started during the year.

We are grateful for the dynamic leadership and visionary guidance provided by Dr. Mangla Rai, Secretary, Department of Agricultural Research and Education, Government of India and Director General, Indian Council of Agricultural Research and Dr. K.M. Bujarbaruah, Deputy Director General (Animal Science) in pursuing research and management activities of the Institute successfully. We offer our sincere thanks to Dr. Lal Krishna, Assistant Director General (Animal Health), Dr. T.J. Rasool, Assistant Director General (AP&B) and Dr. C.S. Prasad, Assistant Director General (AN&P) for continued support and motivation in fulfilling the mandate of the Institute. I am highly thankful to the scientific, technical, administrative and supporting staff of the Institute for their untiring efforts in sincerely pursuing the programmes and contributing towards the mandated goals of the Institute.

I am sure that our stakeholders and partners would find the report useful and provide us their valuable suggestions in accomplishing our mission.

(M.C. Sharma)

CIRG: AN INTRODUCTION

Central Institute for Research on Goats is a premier Institute in the country engaged in research on goats. The Indian Council of Agricultural Research established a National Research Centre on Goats at Makhdoom village in Mathura district of Uttar Pradesh in the year 1975. This Centre was upgraded to the level of a full fledged Institute on July 12, 1979 and named as Central Institute for Research on Goats with a view to improve the productivity of goats and thereby socio-economic status of the goat keepers in the country. This Institute is located at Makhdoom village, on 302 ha of sandy, kans and munj infested ravine land. It is about 2 km away from Farah town (27. 10^0, 78.02^0 E, and 169 m above MSL), about 22 km from Mathura and 32 km from Agra cities. Main gate of the Institute is 1.8 km away from the Delhi-Agra National Highway No. 2. The general topography of the land is highly undulating. Geologically, the land comes under Jamuna alluvial soil category. Underground water resources are saline in most locations excepting some pockets from where drinking water is being harvested.

Vision

"Develop Poor Men'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 develop products processing technologies with the following objectives:

- To undertake basic and applied research in all disciplines relating to goat production and product technology.
- To develop, update and standardize area specific package of practices on breeding,

feeding, management and prophylactic and curative health cover of goats.

- To impart National and International trainings in specialized fields of goat research and development.
- To transfer technologies for improving milk, meat and fibre production and value addition of goat products.
- To provide referral and consultancy services on goat production and product technologies.

The Head quarter of the All India Coordinated Research Project on Goat Improvement is also located at the Institute with 11 centers in different parts of the country. The Institute also maintains a Unit of AICRP on Sheep for Mutton. In addition, the Institute has a Unit of All India Coordinated Research Project on Improvement of feed resources and nutrient utilization for raising animal production. Externally-funded Research Projects like NAIP, DST, UPCST, AP Cess Fund etc. are also functioning at the Institute.

Research Divisions

Division of Goat Genetics & Breeding:

This division is conducting research in the field of goat genetics and breeding, conservation, breed improvement in natural habitats and gene marker studies for enhancing productivity in indigenous breeds, cytogenetic studies for screening bucks for breeding purpose and detecting genetic abnormality leading to reproductive disorders in various breeds. The macro and micro level studies on the population dynamics of goats are also undertaken.

Division of Physiology, Reproduction and Shelter Management:

This Division is primarily engaged in carrying out research in the field of reproduction bio-technology which includes embryo transfer and cryopreservation of buck semen, environmental physiology, management, grazing behaviour and development of goat shelter structures, feeding and watering devices.

Division of Nutrition, Feed Resource & Products Technology:

This Division is engaged in the studies on nutrient requirements of different breeds of goats, feed resource development, conservation and processing. It is conducting surveys on the feeding practices of goats in the villages and in organized farms. Another major activity of this Division is carcass evaluation and grading, preparation of package of practices for hygienic meat production and market survey of goat products like milk and meat etc. Studies are also being undertaken in the area of processing technology for value added milk and meat product preparation.

Division of Goat Health:

This Division is engaged in goat disease diagnosis, treatment and prevention under farm and field conditions. It is conducting surveillance and monitoring of goat diseases. Research work is also aimed at prevention of kid mortality. The Division is actively working in the area of immuno-diagnostics by molecular characterization of M. Paratuberculosis using DNA probes. Studies on parasitic problems and their control through herbal drugs is one of the new thrust areas.

Extension Education and Socio-Economics Section:

Transfer of viable production technologies to the field, studies on socio-economics of goat production under different farming systems and studies on constraints in adoption of newer technologies are the primary goals of this Section. The Section also produces extension aids and publications, organizes and participates in exhibitions, fairs and demonstrations besides training of extension workers and farmers for adopting eco-friendly and sustainable farming systems. This Section also maintains a well equipped Institute Museum.

All India Coordinated Research Project:

With a view to improve the performance of different breeds of goats in different agro-climatic conditions, the AICRP on goats has been functioning with its headquarters at CIRG.

The Project covers studies on goat breed improvement for meat, milk and fiber. A Unit of Muzaffarnagri sheep under All India Coordinated Research Project on Sheep Improvement is also located at the Institute. Another Unit of the All India Coordinated Research Project on improvement of feed resources and nutrient utilization for raising animal production is also functional at this Institute.

SALIENT RESEARCH ACHIEVEMENTS

1. GENETICS AND BREEDING

- Identification of Gene Pools in Goats
- Hemoglobin and Transferring polymorphism were studied in eight Indian goat breeds and the relations of breeds have been established.
- Micro-satellite characterization has been carried out in eight Indian goat breeds using 22 markers and best markers for breed differentiation have been reported.

  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 gastro-intestinal nematodes have been established in Barbari and Jamunapari breeds of goats.

2. NUTRITION AND FEED RESOURCE

(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.
- Entrolobium tree leaves as defaunation agent improved feed intake, nutrient utilization and growth rate in goats.
- 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.

3. PHYSIOLOGY, REPRODUCTION AND SHELTER MANAGEMENT

(i) Conservation of Energy and Climatic Adaptation:

- 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.
- 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.

(iii) Embryo Biotechnology:

- Good quality embryos were successfully collected through non -surgical technique.
- The conception rate in recipient does through surgical transfer varied from 20 to 40%.
- 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 as follows-

(v) Feeding and Watering Devices:

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

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 and maintained.

- A diagnostic kit for detection of J.D has been developed.
- 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 sero types 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.
- A herbal drug against Ectoparasites with the trade name "Alquit" has been developed, validated and found to be very effective.

(iii) Parasitology:

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

5. 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 belonging to 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 such as citric acid, HCl, lactic acid and fermented Paneer whey have been developed and standardized.
- Quality and shelf-life of Khoa, Shrikhand, Channa, Mozzarella cheese, whey drink and Dahi (curd) have been studied.

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.
- About 750 commercial goat farmers of 11 States were contacted. Information from 61 commercial goat farmers on status and constraints in commercial goat farming was collected. 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.

ARIS CELL

- The Agriculture Research Information System (ARIS) Cell was created during 1996. The Linux Operating system and Software used for creation of Internet was based on affordable and sustainable GNU based Open Source Software. CIRG has established the first functional LAN of National Agriculture Research System of India where Internet was available on Plug-n-Practice basis. 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 its web site.
- The web-based e-mail was created making the e-mail 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.

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 Programme on Commercial Goat Farming of 10 days duration in every quarter of the year, for farmers and entrepreneurs.

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 2007-08 में संस्थान को रू0 195.00 लाख योजना मद व रू0 783.00 लाख गैर-योजना मद में आवंटित हुई। इस राशि में से संस्थान द्वारा रू0 131.01 लाख योजना मद व रू0 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 कि0ग्रा0), दूध (379.0 करोड़ कि0ग्रा0), खाल (13.0 करोड़ कि0ग्रा0), पश्मीना (41 मी0 टन) व खाद (90 हजार मी0 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 कार्यो 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 कि0ग्रा0 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 कि0ग्रा0 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 02.79 ± 0.09, 9.98 ± 0.36, 14.97 ± 1.05, 17.89 ± 1.00 व 22.52 ± 1.55 कि0ग्रा0 था। इस नस्ल में 90 एवं 150 दिन का दुग्ध उत्पादन क्रमशः 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 बुन्देल खण्ड में बकरी पालन आधारित समन्वित कृषि प्रणाली विकसित करने हेतु एन0ए0आई0पी0 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 सुदृढ़ीकरण हेतु प्रयास किये गये। कुल 60 सिरोही बकरियों में किये गये कृत्रिम गर्भाधान में सफल निषेचन की दर 41.52 प्रतिशत रही। कम से कम 40-50 प्रतिशत पोस्ट-थॉ मोटलिटी सहित अच्छी गुणवत्ता वाले वीर्य की 500

स्ट्रोज को भविष्य में प्रयोग के लिये भंडारित किया गया। बकरी में ऋतुकाल के समकालीकरण हेतु स्थानीय प्रोजेस्टरान युक्त स्पोंज, रक्त में प्रोजेस्टरोन स्तर 1 नैनो ग्रा0/मि0ली0 से अधिक बनाये रख सके। 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। अतिरिक्त हरे चारे को सुखाने से सम्बन्धित अध्ययन में पोलीहाउस में चारा सुखाना, खुले वातावरण में सूर्य की रोशनी से चारे सुखाने से अधिक प्रभावी पाया गया। वर्षा आधारित वन चरागाह में 8 प्रकार के एकल एवं मिश्रित चारा फसलों का परीक्षण किया गया। जिसमें ग्वार+लोबिया मिश्रित फसल से सर्वाधिक चारा (25.41 टन/है0) प्राप्त हुआ। अलसी एवं कपास की खली के रूप में बकरी हेतुरूमेन बाई पास प्रोटीन पर परीक्षण किये जिसके परिणाम आशाजनक रहे। संस्थान द्वारा विकसित स्थान विशिष्ट खनिज लवण मिश्रण का पशुओं में प्रयोग अत्यधिक लाभकारी पाया गया। अध्ययन में पाया गया कि इस मिश्रण के प्रयोग से गाय व भैंसों में 72 प्रतिशत रिपीट ब्रीडिंग व 15 प्रतिशत बाँझपन की समस्या दूर हुई। नीलगाय से प्राप्त फफूंदी इनोकुलेट करने पर, बकरियों द्वारा तुलनात्मकरूप से अरहर भूसा के रूप में अधिक चारा ग्रहण किया।

महीना, मौसम व दुग्ध अवस्था का बकरी दूध संगठन पर प्रभाव का आंकलन किया गया। कुल ठोस पदार्थ व वसा फरवरी, सितम्बर व अक्टूबर माह में तुलनात्मकरूप से अधिक पाई गई। जमुनापारी बकरी के दूध में वसा की मात्रा गर्मी में सबसे कम (3.27 ± 0.03 प्रतिशत) व बसन्त ऋतु में सर्वाधिक (4.80 ± 0.11) थी। बकरी मांस की गुणवत्ता पर

अध्ययन में पाया गया कि पूरक दाने के साथ विशिष्ट खनिज लवण मिश्रण खिलाने पर अर्ध-सघन पद्धति के अन्तर्गत पाली गयी बकरियों के विभिन्न कट्स के भार में वृद्धि हुई। करी पत्ता चूर्ण को बकरी मांस में मिलाकर एन्टीओक्सीडेन्ट के रूप में 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 15 पौधों की छंटनी की गयी। इन-विट्रो परीक्षणों के दौरान लहसुन का सत कोक्सीडियोसिस के खिलाफ अत्यधिक प्रभावी पया गया। मेमनों में दस्तों के उपचार हेतु तैयार किये गये 8 पादप सतों का परीक्षण किया गया। इनमें से 4 प्रोटोटाइपस का सम्भावित दस्त विरोधी हर्बल दवा बनाने हेतु चयन कर लिया गया। बकरी में ब्रूसेलोसिस रोग के कारक ब्रसेला की पहचान आणविक स्तर पर की गयी। बकरियों में माइकोप्लाज्मोसिस रोग पर अध्ययन में इम्यूनो-रिएक्टिव प्रोटीन बैंडस की पहचान की गई। 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।

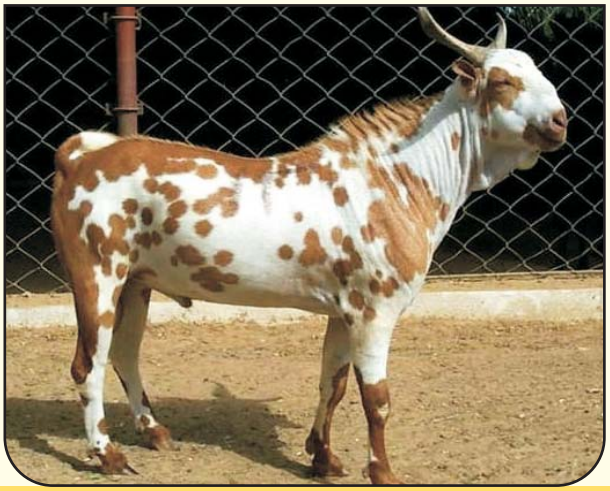
संस्थान द्वारा विकसित नवीन तकनीकों का मूल्यांकन एवं स्थानान्तरण सुचारू एवं प्रभावी रूप से एक विशेष परियोजना के अन्तर्गत किया गया। इसके परिणाम स्वरूप गोद लिये गाँवों में बरबरी बकरियों का प्रतिशत बढ़ा व बकरी मृत्यु दर कम हुई। उन्नत तकनीकों का अंगीकरण व ज्ञान व अभिवृत्ति को मापने हेतु टैस्ट व पैमानों का 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 पहुचांने के लिए संस्थान द्वारा गतवर्ष में 4 राष्ट्रीय प्रशिक्षण कार्यक्रम आयोजित किये गये। संस्थान द्वारा मंगोलियन वैज्ञानिकों के लिए 2 माह के एक अंतर्राष्ट्रीय प्रशिक्षण कार्यक्रम का आयोजन भी किया गया। इस वर्ष 12 पी0एच-डी0 एवं 10 एम0एससी0 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 791 सम्बन्धित व्यक्तियों व संस्थाओं को परामर्श सेवा दी गई। यह परामर्श विभिन्न वर्गो के लिए अत्यन्त लाभकारी सिद्ध हुआ।

EXECUTIVE SUMMARY

Central Institute for Research on Goats (CIRG) was established in 1979 to conduct basic, fundamental and applied research in all aspects of goat production. Director is the Head of the Organization assisted and guided by Research Advisory Committee (RAC) and Institute Management Committee (IMC). The Institute presently has 38 Scientists including Director, 72 Technical staff, 39 Administrative and 100 Supporting staff. The total annual budget allocated to the Institute for 2007-08 was Rs. 195.00 Lakh under plan and Rs. 783.00 Lakhs under non-plan. Total expenditure was Rs. 131.01 Lakh under plan and 710.67 Lakh under non-plan.

The goat population in the country is likely to reach a figure of 130 million by 2010. Goats contribute 521 million kg of meat, 3790 million kg of milk, 130 million of skins, 41 metric tones of Pashmina and 90 thousand metric tones of manure annually to the national economy. CIRG, Makhdoom is actively engaged in conducting research, training and extension activities on all aspects of goat production and utilization with a view to improve the productivity of goats in respect of milk, meat and fibre.

The selective breeding programme has been executed in the nucleus goat flocks and also in their natural habitat involving farmers' flocks. 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 3.28±0.03, 11.99±0.14, 16.41±0.22, 21.54±0.38 and 27.06±0.38 kg in Jamunapari and 1.87±0.10, 6.40±0.10, 12.45±0.09, 17.66±0.11 and 22.33±0.13 kg in Barbari, respectively during the period under report. In case of Jamunapari field unit mean body weights of the kids at birth, 3, 6, and 9 months of age were 2.41±0.06, 15.54±0.23, 22.15±0.48 and 27.22±0.60 kg. Average milk yield in the two breeds at 90 days was 103.1±2.0 and 58.81±1.52 liters, respectively during the year. The average lactation length in Jamunapari was 169.9±3.1days and in Barbari 109.80±3.99 days. Body weight at birth, 3, 6, 9 and 12 months age averaged 2.78 ±0.09, 9.98±0.36, 14.97±1.05, 17.89±1.00 and 22.52±1.55 kg, respectively in Jakhrana kids during the reported period. The average milk production in Jakhrana was recorded to be 109.87±3.99 and 145.69± 4.75 liters in 90 and 150 days, respectively. The elite germplasm of Jamunapari, Barbari, Jakhrana and Sirohi breeds numbering 56,195, 2 and 1 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.

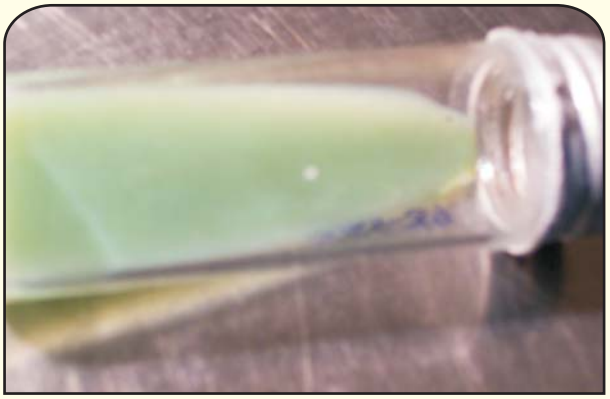
Studies on refinement of frozen semen technology were continued and efforts were made for strengthening of goat semen bank. A total of sixty Sirohi goats were inseminated with the overall conception rate of 41.52% on actual kidding basis. A total of 500 good quality straws having post thaw motility of minimum 40-50% were stored for further use. Progesterone impregnated sponges were prepared indigenously and tested for their retention and synchronization of oestrus in goats. Sponges containing 300 mg progesterone maintained the blood level of progesterone above 1 ng/ml. Studies on adaptability in Barbari and Sirohi bucks and goat-waste management have been initiated. The Barbari bucks were physiologically better adapted in intensive system of goat production and Sirohi bucks in semi-intensive production system.

The feeds available to goats are poor in quantity and quality. In the study on drying of surplus green fodder, the drying rate was recorded higher under poly house drying as compared to ambient solar drying irrespective of swath thickness. Under rainfed agro forestry system, four fodder legumes were raised as sole crops and in combination i.e. Lobia, Sunhemp, Sesbania, Guar + Lobia, Sesbania (low density), Control, Sesbania + Sunhemp, Sesbania + Lobia. Maximum biomass production of 25.41t/ha was associated with the Guar + Lobia combination. Supplementation of concentrate mixture with rumen by-pass protein in 3 combinations of Linseed cake: Cotton seed cake 30:70 (T1), 50:50 (T2) and 70:30 (T3) were evaluated in pregnant and lactating goats. T2 (50:50) has shown promising results in terms of performance of pregnant goats and their off-springs. Trials on area specific mineral mixture showed beneficial effect of use of area specific mineral mixture. With feeding of mineral mixture, 72% of cattle and buffaloes suffering form the problem of repeat breeding conceived on no return basis, and 15% cases of anoestrous in cattle and buffaloes were restored with in 15-65 days. A group of male goats fed area specific mineral mixture under intensive system indicated higher body weight gain and better rumen fermentation pattern in comparison to non-mineral fed group. Efficient fungal species (*Orpinomyces*) isolated from Nilgai was selected on the basis of higher estimated fibrolytic enzyme activity. Goats administered inoculated exotic fungi *Orpinomyces* species had significantly higher ($P < 0.05$) intake of Arhar straw in comparison to the control group.

Effect of months, season and stage of lactation on goat milk composition was studied. Fat content was higher during February, September and October viz. 5.14 ± 0.07, 5.07 ± 0.07 and 5.40 ± 0.03 %, respectively. Total solids content was also noticed higher during these months resulting better paneer yield. Fat content was observed higher (4.80 ± 0.11) during

spring/autumn and lowest (3.27 ± 0.03) during summer season in Jamunapari goats. Type of birth had no effect on milk composition. Carcass study showed that supplementary feeding along with specific mineral mixture improved various cuts weight in Barbari kids maintained under semi-intensive system. The curry leaf powder (CLP) had potent antioxidant effect as measured by DPPH method and its use in fresh meat did not impart any negative effect on meat quality.

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, 15 plants were selected for in-vitro and in-vivo trials against different stages of coccidia. In-vitro trials, *Allium sativum* extract successfully checked sporulation even in lowest concentration. Diarrhoea in young kids is a serious problem. Eight potential plant candidates were selected for clinical study by preparing combinations for synergistic activity. Clinical trails of four prototypes have shown potential as antidiarrhoeal in goats. Suspected *Brucella* isolates were isolated and morphological, biochemical and molecular characterization done. For the diagnosis of mycoplasmosis, in immunoblot the immuno-reactive protein bands were found to be in higher range of 90 kDa to 250 kDa. Moreover 2 promising immuno-reactive bands were observed at 20 kDa and 30 kDa, which needs further study. Trials of the first 'indigenous inactivated Johne's disease vaccine' (IIIJDV) were conducted in goats and sheep in different regions of the country and the vaccine has shown encouraging results in terms of prevention and control of JD.



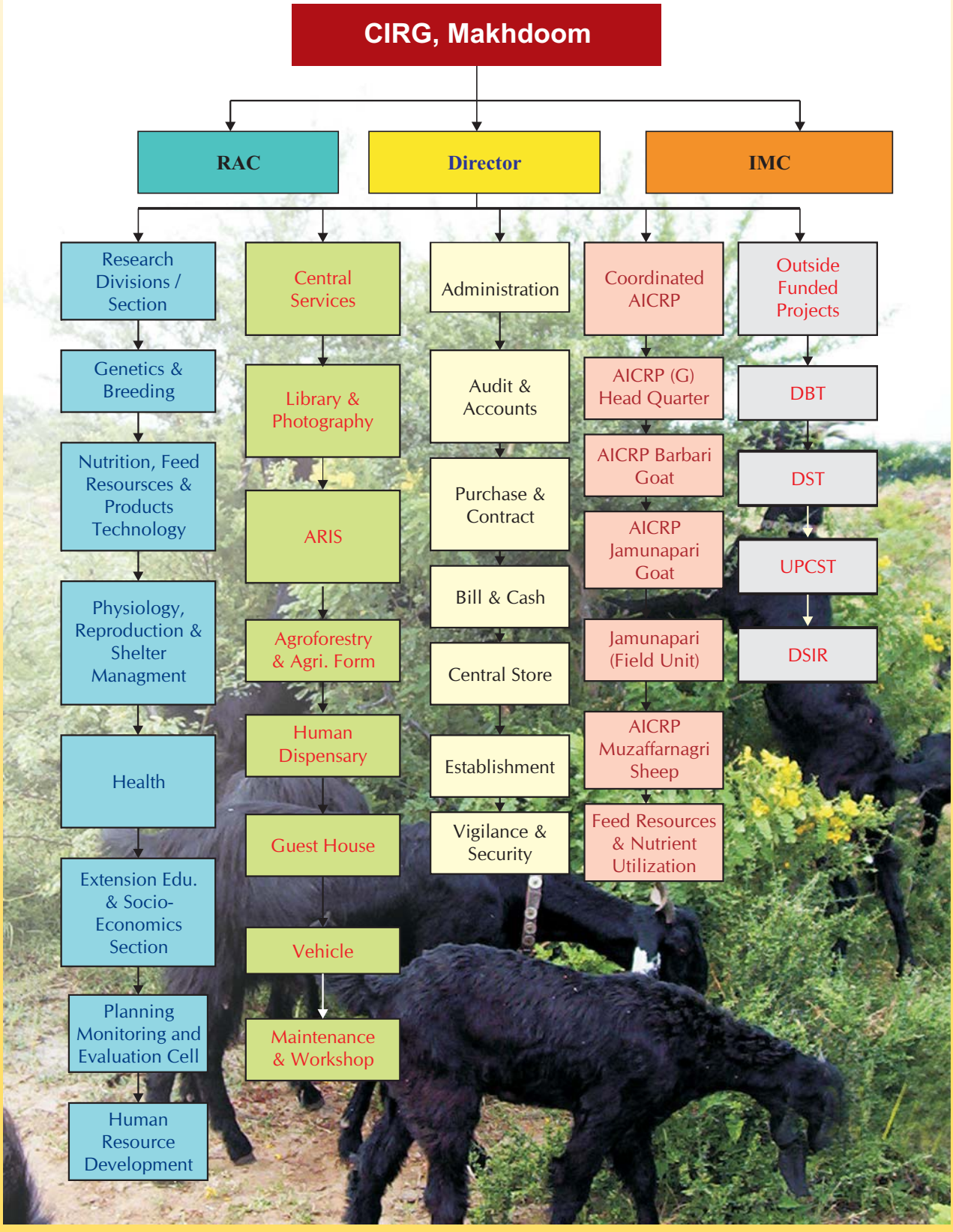
Technologies developed by the Institute were transferred and evaluated at the farmer's door through the multi-disciplinary Project. The Project has resulted in proportionately higher share of Barbari goats in the adopted villages, lower mortality and morbidity and adoption of better marketing strategy. 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 is in progress.

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. A 2-months International Training Programme on Goat Semen Freezing and Embryo Transfer was organized for Mongolian

scientists. A total of 12 Ph.D and 10 M. Sc. students were admitted during the year for undertaking research work under the guidance of scientists of the Institute.

Consultancy services on goat production and utilization were provided to several national and international agencies. A total of 791 entrepreneurs, goat farmers, professionals, students and representatives of development agencies got benefited through advisory and consultancy services.

ORGANIZATIONAL SETUP



FINANCIAL POSITION

(On March 31, 2008) (Rs. in Lakhs)

Head	Plan		Non-Plan	
	Allocation	Expenditure	Allocation	Expenditure
1. Establishment Charges	0.00	0.00	505.00	481.13
Wages	0.00	0.00	100.00	98.25
OTA	0.00	0.00	0.20	0.20
2. T.A.	2.00	1.84	2.65	1.55
3. HRD	1.00	0.91	0.00	0.00
4. Other Charges including equipments	192.00	128.26	140.15	108.82
5. Works	0.00	0.00	35.00	20.72
6.Land develoment	0.00	0.00	0.00	0.00
TOTAL	195.00	131.01	783.00	710.67

STAFF POSITION

(on March 31, 2008)

Category	Sanctioned	Filled
Director	01	01
Scientific	56	37
Technical	72	72
Administrative including Non-Min. staff	39	39
Supporting	104	100
Temporary Status	114	114
TOTAL	386	363