



Central Arid Zone Research Institute

CAZRI NEWS

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From the Director...



The National Dairy Plan (Phase I; 2011-12 to 2016-17) envisages to increase productivity of milch animals and to provide rural milk producers a greater access to organized milk processing centres in 14 states, including Rajasthan. On account of its drought hardiness, the Tharparkar cattle hold a great promise for its promotion under this plan for the State of Rajasthan and elsewhere.

Originating from the former princely state of Vijayanagarm, presently part of Karnataka; the Tharparkar came into prominence during the first World War when some animals were taken to supply milk for the Near East army camps. Here their capacity for production under rigorous feeding and unfavourable environmental conditions became apparent. This has the ability to produce approximately 1135 kg milk per lactation when maintained on grazing on arid pastures, while animals maintained in the villages yield about 1980 kg milk per lactation. The recent studies have shown that status of A2 allele of beta casein gene is 100 per cent in this breed when compared to only 60 per cent in exotic breed like Jersey and HF. The A2 allele is responsible for making available more Omega-6 fatty acids in the milk.

Thus conservation of this breed along with improvement and other management issues like nutrition and health indeed need due emphasis. This institute is committed to design its research and development programmes in this area in collaboration with other relevant research organizations for realizing its true potential for the dairy sector.

-M.M. Roy



RESEARCH ACTIVITIES

DIVISION OF LIVESTOCK PRODUCTION SYSTEMS AND RANGE MANAGEMENT

The Division conducts research on drought stress in livestock, efficient utilization of locally available feed and fodder resources, range management and value addition to feed, fodder and livestock products in systems perspective for sustainable livelihood of the people.

Characterization of Arid Breeds of Livestock

Tharparkar cow: A well-adapted desert species has endurance and resistance to famine and drought. The average age of first calving is 1340 days. Milk yield in 305 days lactation and total lactation length are 2038 and 2225 litre, respectively with peak yield of 10.3 litre. The average values of lactation length, dry period and calving interval are 347, 156, 505 days, respectively.

Marwari goat: A dual purpose (milk and meat), medium sized breed having distinctive black colour with long or speckled ear. Horns are corkscrew type and animals have a curly tuft of hair on forehead. The body weight of adult male and female are 41.3 and 30.2 kg, respectively. The average age of first kidding is 560 days with 304 days kidding interval. Animals produce 135.4 litres milk in a lactation length of 219.8 days with peak yield 1.05 litres in a day.

Parbatsari goat: This is an important strain of Sirohi breed having light to dark brown coat colour. The horns are present in all animals and the ears are mainly pendulous type. The adult body weight is 45.8 and 34.5 kg for male and female, respectively. The average age of first kidding is 578 days and kidding interval 324 days. Animals produce 160.8 litres milk in a lactation length of 238.1 days with peak yield 1.21 litres in a day.

Livestock Production Systems

Studies on impact of drought on availability of feed and fodder, fertility, health and productivity of animals revealed malnutrition and post-partum reproductive diseases in cattle in all the districts of western Rajasthan. In small ruminants kidding/lambing reduced to once in a year due to drought conditions. Dietary supplementation with protein, energy and minerals is required to mitigate the deficiency conditions.



Parbatsari goat



Marwari goat

Preferential Grazing/Browsing Behavior of Small Ruminants: In a silvi-pastoral system, the animals preferred weed flora, i.e. *Cyperus rotundus*, *Eleusine indica*, *Digitaria marginata*, *Celosia argentia*, *Eragrostis indica*, *Amaranthus* sp. and *Tribulus terrestris*, followed by Sewan and Anjan grass. Among the trees, Anjan (*Hardwickia binata*) tree leaves were preferred to Mopane leaves.

Improved Animal Shelter: Improved animal shelter having East-West orientation with thatched roof panel of local material was developed for alleviation of hot and cold stress in arid region. This shelter provided comfortable micro-climate to the animals during extreme weather conditions, raising temperature by 2-3°C in winter, and consequently resulted in increased growth and milk production.

Silvi-pastoral Systems and Forage Production: Silvi-pastoral model for marginal and small farmers involving pasture grasses (*Cenchrus ciliaris* and *Lasiurus indicus*) in association with fodder trees (*Hardwickia binata* and *Colopophorus mopane*) and legumes (cowpea, Lablab bean) has been developed for higher productivity for sustainable livestock production.

Under 50 mm of life saving irrigation, maximum green fodder yield was obtained with sole pearl millet, which was significantly higher than sole cowpea and *C. ciliaris* during kharif season. Oat- pearl millet sequence produced maximum green fodder yield while *C. ciliaris* + Lucerne intercropping system produced maximum dry fodder yield under limited irrigation.

Livestock Nutrition and Health Management: Mineral deficiency (Ca, Mn, and Cu) during summer and shortage of grazing resources led to the occurrence of pica and progressive debility in cattle and buffalo heifers. Area specific mineral mixtures for Jodhpur, Barmer and Jaisalmer districts have been developed.

Vitamin A Status in Livestock: The milk of Marwari goat possesses higher vitamin A activity than that of Parbatsari goats. Milk retinol, total RE and milk-lipid RE during summer were lower than during monsoon and winter. An appropriate formulation and process technology for production of Alfalfa meal blocks for supplementation of pro-vitamin A and other critical nutrients have been developed.

Effect of Supplementation of Mineral Mixture: Different nutritional supplements were evaluated for improving livestock productivity. Milk yield of Rathi cattle, during lean period (November to February) increased by feeding balanced concentrate having 2% mineral mixture. Further increase in milk was found by replacement of 25% pelleted concentrate feed with mustard seed cake. Alternate day supplemental concentrate feeding to kids resulted in higher growth rate and milk yield.

Feeding trials with thorn less cactus (*Opuntia ficus indica*): Mixing of cactus leaves up to 33% with locally available legume straw showed good acceptability and palatability both by small ruminants and cattle. It can be a good source of nutrition for the ruminants.

Supplementation of Probiotics and MNM: Supplementation of probiotics (*Saccharomyces cerevisiae* 1.4×10^9 cfu day⁻¹) and multi-nutrient mixture (MNM) 100g day⁻¹ in Marwari goats enhanced the growth of kids and milk yield of lactating goats and gave higher net returns.

Non-conventional Feed Resources: Lana (*Haloxylon salicornicum*) seeds can be included as a source of protein in the diet of adult goats up to 25% of the concentrate mixture without any adverse effect on growth and health. Lactating Rathi cattle fed with lana seed had more fat, protein, SNF and lactose in milk. Lana seed can be safely used in the concentrate mixture replacing 25% til (*Sesamum indicum*) seed cake in the ration of lactating cattle.

A balanced concentrate mixture, costing less than traditional concentrate, using locally available feed ingredients, viz. *Prosopis juliflora* pods, *Citrullus colocynthis* seed cake and mineral mixture is acceptable, palatable with no ill effects on health of animals.

Value Addition to Goat Milk and Meat

Technologies for value addition to products from goat milk viz, Kulfi, Paneer, flavoured whey drink; and goat meat like nuggets and sausages have been developed. The kulfi is accepted as a delicacy and has a cost benefit ratio of 1:2, whereas paneer also has a consumer preference. Lactoperoxidase enzyme that enhances shelf life is higher in goat milk than in cow milk.



Silvipasture system



Improved animal shelter

OTHER ACTIVITIES

National Workshop

A workshop on “Managing Resources for optimizing land productivity in Thar Desert” under UNESCO sponsored project on SUMAMAD-Phase II was organized on 19th July, 2013 at RRS, Jaisalmer. Organizing secretary by Dr. P. Santra, Sr. Scientist, CAZRI Jodhpur welcomed all the participants. Dr. O.P. Gill, Vice Chancellor, Maharana Pratap University of Agriculture and Technology, Udaipur; inaugurated the workshop. In his Chief Guest address, he pointed out that in climate change situation; there is a need to evolve innovative cultivation practices and optimum management of the resources. Dr. M.M. Roy, Director, CAZRI, Chairman of the workshop, pointed out that management of natural resources in dry land is highly essential and the activities under the project carried out in the field will enhance the land productivity. He stressed out that for sustainable growth and development, integration of indigenous knowledge and the research technology is very important.

Dr. J.P. Singh, the project investigator and the Head of RRS Jaisalmer, presented brief findings of the project. He also mentioned that several field trainings, demonstrations and animal health camps were organized under the project to increase the capacity building of the farmers.

In the workshop, five technical sessions were conducted under themes: rangeland management and agroforestry, arable arid farming, soil and water management, livestock management and energy management - socioeconomic issues. In each technical session, experts on the subjects delivered



and discussed their views and ideas on management of resources in dry lands and future strategies for their optimum utilization. The vote of thanks was proposed by Dr. H.R. Mahla, Sr. Scientist, RRS, Jaisalmer.

ICAR – Agricultural Education Day

The Agriculture Education Day was celebrated on 07 August 2013 for promoting the spirit of agriculture and allied subjects among the students. The day was marked with the participation of about 70 B.Sc.I from the Mahila P.G. Maha Vidhalaya, and 30 students of 10+2 agriculture discipline from Chopasni Sr. Secondary School along with their teachers. Students were taken around the institute for exposure to R & D activities of institute. They visited ATIC, Solar and Agriculture Implements yard and Desert Botanical Garden. At the end students visited museum of the institute.

Dr. V.K. Manga, Principle Scientist and Chairman HRD & HE gave the welcome address and told students about the spirit behind celebrating agricultural education day. This was followed by lectures by the scientists of the institute, on climate change, use of nanotechnology in agriculture and career opportunities in agriculture.

A quiz competition was also held. Chief guest Dr. Yudhvir Singh, Zonal Project Director Zone-VI, distributed prizes to the successful students. In the closing function Dr. Yudhvir Singh addressed the students. He stressed on the role of education in the development of the society and the role of KVKs in the demonstration and popularization of the new technology. Dr. M.M. Roy, Director CAZRI, Jodhpur expressed happiness about the enthusiasm with which students participated in the celebrations of the agricultural education day and expressed his satisfaction that they have made themselves aware of the technologies developed at this institute.



Brain Storming

A session on “Improving Crop Water Productivity in Indira Gandhi Canal Command Area” was organized on 19th August, 2013 at RRS, Bikaner. About 40 participants from different RRS of CAZRI (Bikaner, Jaisalmer and Pali) and ICAR institutes (CIAH Bikaner, NRCC Bikaner, CSWRI Bikaner and NRCE Bikaner), Swami Keshwanand Rajasthan Agricultural University, IGNP and NGO from Bikaner actively participated. Director M.M. Roy chaired the session and briefed about the agriculture scenario in arid zone, problem and prospects of water availability and its use.

Dr. N.D. Yadava, Head RRS Bikaner briefed about the ongoing ICAR- ICARDA project in IGNP area on evaluation of CropSyst model. He highlighted issues of sustainable integrated farming system models with adequate ratio of livestock and tree/woody components. A need for sufficient budgetary allocation for maintenance of canal, checking conveyance losses by suitable lining material, incentives to the farmers growing low water requiring crops and discouraging high water requiring crops, adopting water saving technologies, enhancing the support price for the low water requiring crops and community based linked research programme with proper linkage with line departments were discussed.

Director, CAZRI, had inaugurated new farm building RRS, Bikaner at this occasion.

Farmers Fair cum Farm Innovation Day

It was organized at CAZRI, Jodhpur on September 19, 2013. Shri Rajendra Singh Solanki, Chairman, Jodhpur Development Authority, Jodhpur was the Chief Guest and inaugurated the fair. He urged the farmers to continue interaction with the scientists for improving the knowledge and getting maximum benefit from agriculture and livestock production by adopting improved technologies.

Dr. A.K. Purohit, Guest of Honour, hailed the achievements of CAZRI in solving the farmer's problems and appreciated the efforts made for bringing the related stakeholders at one forum. He emphasized upon the synergy in integrated farming systems and better coordination among the CAZRI, State Agriculture Departments and NGOs for sustainable development of agriculture and livestock production in the region.

Dr. A.K. Mishra, Officer-in-charge KVK, Jodhpur stated role of KVK in diffusing the latest technologies among the farmers. Dr. P.C. Pande, Head of Division mentioned, diversification is the only alternative for realizing maximum benefit and improving livelihood under present marketing scenario.



More than 2000 farmers from Jodhpur, Jaisalmer, Barmar, Pali, Sirohi, Jalore, Nagaur, Udaipur districts of Rajasthan attended the Kisan mela and Kisan goshthi. 35 stalls on improved technologies and products were displayed by the ICAR institutes (CAZRI, CIAE, NRCE, CSWRI, DRRM, NBPGR), SKRAU, State Departments (Agriculture, Horticulture, Animal Husbandry, Locust Surveillance), Ayurveda University, Central Wool Board, NGOs, Agricultural Industry and others. Eight innovative farmers of Western Rajasthan were awarded by CAZRI, who shared their experiences during the scientists-farmers interaction

XXXIII INCA International Congress: on “Integrated Decentralized Planning: Geo Spatial Thinking, ICT & Good Governance” (19-21 September, 2013)

Trainings Organized

- Training on “Integrated Nursery Raising Technology for Arid Fruit Plants” at CAZRI Jodhpur from 23-24 August, 2013
- Training on “Integrated Farming System and Alternate Land use” at CAZRI Jodhpur from 29-31, August, 2013

- Short Course on “Geostatistical modelling for spatio-temporal assessment of soil and water resources” at CAZRI Jodhpur from 2-11 September, 2013
- Short course on “Remote Sensing & GIS for Natural Resources Mapping & Management” at CAZRI Jodhpur from 11-18 September, 2013
- On-campus training on “Management of Grasslands in Arid Ecosystem” at KVK, CAZRI, Kukma, Bhuj from 23-24 September 2013
- One on-campus training on “Propagation Techniques for Arid Fruit Crops” and eight off-campus trainings for farmers and team members of watershed development were organized by KVK, CAZRI during September to October 2013

Meetings

- Bimonthly Review Meeting of KVKs under the jurisdiction of SDAU, Dantiwada was organized on 26-09-2013 at KVK, CAZRI, Kukma, Bhuj. The meeting was chaired by Dr. K.A. Thakkar, Director, Extension Education, SDAU, Dantiwada. 30 participants from seven KVK (Deesa, Khedbrahma, Samoda, Kheva, Mundra, Rangheja and Kukma), Farm Women Training Center - Rapar, NAIP-III project, Department of Extension Education (CPCA, Veterinary College & Home science College, SDAU) participated in the meeting.

Exhibitions

- **August 18** : State level Van Mahotsav (Forest Deptt.) at Village Kiali Beri Motisara Van Khand, Jodhpur
- **August 19** : Bharat Nirman Jan Soochna Abhiyan Mela at Village Marwar Junction, Pali
- **September 13** : Bharat Nirman Jan Soochna Abhiyan Mela at Village Luni, Jodhpur
- **September 19** : Kissan Mela and Navachar Diwas at CAZRI Campus, Jodhpur
- **September 20-21** : XXXIII INCA International Congress at ISRO, Jodhpur
- **September 28-29** : Kissan Mela at NRCSS, Ajmer

Awards

- Dr. P. Rathakrishnan received best paper award and certificate of excellence in the International conference on “Impact of climate change on food, energy and environment” held at Sathyabama University, Chennai during 4th – 6th July, 2013
- CAZRI, exhibit received IInd best exhibition award in XXXIII INCA International Congress at ISRO, Jodhpur

Appointments

- Dr. Mahendra Singh Raghuvanshi, Sr. Scientist (Agril. Extension) at RRS, Leh (J & K) on 31.7.2013
- Dr Ranjay Kumar Singh, Sr. Scientist (Land & Water Management Engineering) on 31.7.2013

Promotion

- Sh. J.S. Chouhan, ACTO to CTO, w.e.f. 1.7.2010

Transfer

- Dr. D. C. Bhandari Principal Scientist (Economic Botany & Plant Genetic Resources) from NBPGR New Delhi (4.7.2013) to CAZRI, Jodhpur

Deputation

- Dr. Shalander Kumar was selected as Special Project Scientist–Dryland Systems in South Asia at ICRISAT, Hyderabad for 3 years.

Visits/Trainings Abroad

- Dr. M.M. Roy, Director participated in Workshop “South Asia Target Regional Implementation and Partnership” at Kathmandu (Nepal) during August 26-28, 2013
- Dr. S.P.S. Tanwar, Sr. Scientist participated in “APO event 13-AG-16-GE-WSP-B Workshop on developing farming system for climate change mitigation” at Colombo, Sri Lanka during August 26-30, 2013
- Dr. H.R. Mahalla, Sr. Scientist deputed for training on “Marker Assisted Selection” at Michigan State University, East Lansing, MI, USA from August 23 to November 23, 2013
- Dr. M.M. Roy, Director participated in “International Grassland congress (IGC) and International Rangeland Contress (IRC)- 2013” at Sydney (Australia), during September 15-19, 2013
- Dr. P. Santra, Sr. Scientist deputed for training on “Geo-Informatics” at ISRIC, World Soil Information/ESG, Wageningen UR, The Netherlands from September 14 to December 14, 2013.

Superannuations

- **August 2013** : Sh. R.S. Chouhan, TO, Sh. Chattar Singh, Sr. Clerk
- **September 2013** : Sh. A.K. Kalla, ACTO, Sh. Mahendra Singh, Stenographer

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