

**INDIAN SOCIETY OF
&MANAGEMENT**



(Regd. No. 1292/12)

ANIMAL PRODUCTION

Recommendations of ISAPM Seminars etc.

1.

Workshop on Methodology to teaching, Research & Extension in Animal Production and Management

Department of LPM, Veterinary College, J.N.K.V.V., Jabalpur

20/8/82, 1985

Major recommendations

1. It is well known that animal scientists today know enough of Breeding and feeding but very little of management on account of which livestock and poultry farming failed to be economically viable concerns. It is therefore recommended to establish Indian institute on management of animal production to conduct research on recent advances in animal production.
2. Animal Production and Management Researches at National Institutes and State Agricultural Universities should be strengthened and not dismantled and disintegrated
3. UNDP centres of excellence in animal production management should be established on priority in different regions of the country viz. East, West, North, South and Central.
4. In such of the State Agricultural Universities and institutes where separate department s/divisions of LPM exist should be established without any further delay.
5. Post gradates teaching programme should be started in the departments where only Masters programme exists, it should be strengthened and Ph. D programme started so that the M.V. Sc scholars of this discipline are not put to disadvantage by being compelled to change their discipline in Ph. D. programme.
6. There is acute shortage of quality crossbred bulls. It is therefore recommended that efforts should be made to raise them in sufficient numbers. Package of practices for management of such bulls should be evolved for production of quality semen. Breeding management practices should be developed to prevent reproduction disorders in crossbred animals.
7. For inter-se mating only top ranking bulls should be used. For this purpose progeny testing should be undertaken for their evolution under field conditions.
8. Fodder production should be enhanced through establishment of seed farms and by providing necessary inputs educating farmers and establishing fodder banks throughout the country.

9. Field studies should be conducted to popularize research findings on utilization of waste products and industrial by products for livestock feeding.
10. Research to evolve suitable housing systems for various species of livestock should be conducted so as to provide comfort and maximize the production in different climatic zones. This aspect is of special significance in view of massive crossbreeding programme taken up in the country.
11. Studies on behavioral pattern in animals of various classes and species should be undertaken to improve the management practices.
12. Researches on development of animal farming systems to suit the need of different categories of farmers viz landless agricultural labourers, as well as marginal, small, large and elite farmers should be conducted in different agro climatic regions.
13. Research should be conducted on recycling of animal wastes for their proper utilization to make production management remunerative.
14. Field studies for popularizing crossbreds as bullocks should be intensified in order to counter the false notion against their utility.
15. Management practices for maximizing the milk harvest need to be evolved.
16. Studies on feeding and management practices to harvest maximum and quality meat should be undertaken
17. Package of management practices should be developed for each species of livestock under different agro climatic zones.
18. Schemes for the utilization of surplus buffaloes male calves for meat need to be formulated by each state.
19. Health management practices to minimize losses due to various diseases should be strictly followed. Further research in this regard in respect of the existing and emerging diseases should be conducted.
20. It is necessary to establish suitable livestock marketing organizations for ensuring satisfactory return to the producer. To achieve this objective suitable criteria for selection and pricing of animals should be developed through researches.
21. Studies on management of hitherto neglected species such as Mithun, Yak and rabbits need to be undertaken.
22. Field studies on the identification of available unrecognized indigenous livestock and poultry germ plasm and their performance should be carried out.

2.

**National symposium “On The Role of Animal Production and
Management in Rural Development In India”
Assam Agril. University, Khanapara, Guwahati,
24-26Jan, 1986**

TS-I

1. Systematic development of manpower to revitalize the animal production programme: imparting technical training, organizing meeting, workshop, seminar with the farmers
2. Development of suitable technology to treat different agricultural and industrial by products as low cost feed ingredients for poultry.

3. Implementation of quail production programme to have its impact on rural economy
4. Establishment of national institute for pig production and management.
5. Establishment of national research centre for Mithun and Yak.
6. Strengthening of extension wing of agricultural universities for implementation of various animal production programme in the rural areas.

TS-II

1. Infusion of exotic blood to improve the local recognized breed of draft cattle for milk production
2. Immunization may be considered for the protection of known diseases even with different types of organism
3. Realization of immediate important buffaloes for milk production and maintenance of pure Indian breeds of cattle for milk and work as compared to crossbred in rural economy

TS-III

1. Adoption of sheep farming in specific zone for development of wool industries.
2. Adoption of goat rearing in a specific zone for development of meat for supply to the metropolis and for production of milk rural development.

TS-IV

1. Introduction of turkey farming in rural areas by extension backed by marketing, supply of poult, technical knowhow etc. studies on turkey farming in rural areas necessary.
2. Studies in the field APM should include nutritional, seasonal, economical and Management aspect of poultry.
3. The problem of near 100% mortality among khaki Campbell ducklings supplied to villagers or reared on farm needs detailed investigation.

TS-V

1. All the animal husbandry programme in the state should be implemented by veterinary and animal husbandry services of the state concern so that desired goat of productivity can be achieved.
2. Agricultural by products like rice and wheat bran, oil cake etc may be distributed through FCI for maintain price and also to make available these essential feed ingredients to the livestock production programme of the state.

3.

National seminar on “Recent Technologies in Uplifting the Socio-economic status of Rural People through Livestock Production and Management”
GBPUA&T, Pantnagar
April 20-22, 2006

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1. To improve the reproductive and productive efficiency of animals good quality fodder green as well as dry and balanced concentrate mixture containing area specific mineral mixture should be popularized at farmers level.
 2. The research work should be strengthened to develop the proper housing system for livestock and poultry production in the temperate region of the poultry.

3. Proper housing and farrowing facilities should be developed for avoiding the early piglet mortality in the swine
4. More emphasis should be given on genetic characterization and conservation of locally available indigenous breeds
5. Budget allocation for development of livestock sector should be made available in proportion to its contribution to GDP
6. Unscrupulous use of insecticides and pesticides should be restricted preference should be given for the use of biopesticides
7. Value addition of animal products and utilization of livestock waste products should be popularized to strengthen the rural economy.

4.

National Symposium on “Technology Management, Visioning and Up scaling for Accelerating Livestock Production, Assam Agril. University, Khanapara, Guwahati 10-12 Nov, 2010

1. Strategy for conservation of local breeds needs to be undertaken.
 2. Popularization of rabbit farming is recommended in suitable agro-climatic zones of the country
 3. Marker assisted selection for genome analysis should be taken up for decreasing cost of production, increasing profitability and disease resistance in livestock
 4. Feed block should be prepared for livestock by incorporating locally available feedstuffs.
 5. Anti stress preparations in the broiler ration may be incorporated for better performance and optimum economic returns.
 6. Use of herbal medicines and organic farming to be promoted for consolidating livestock health and productivity.
 7. Chemical composition and nutritive value of locally available fodder should be determined while formulating economic ration for livestock and poultry.
 8. Rural womenfolk should be engaged in technology transfer and extension works
 9. Involvement of the State Govt. in granting financial support to various NGO's, Self help group, Women entrepreneurs dealing with rural dairy farming for augmenting milk production under rural sector.
 10. Small farmers should be supported by insurance coverage to guard against natural calamities.
 11. Proper co-ordination should be built up between the State Agricultural Universities and Veterinary Health and Production Department.
 12. Organized slaughter house/pork processing plants need to be established for quality pork production and further processing for value addition.
 13. Wildlife habitat need to be strictly protected for conservation of wildlife and to prevent man-animal conflicts.
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5.

National Symposium On Emerging Management Concepts For Sustainable Livestock And Poultry Production, GADVASU, Ludhiana- 141 004, Punjab, India, Nov 2-4, 2011

ICAR consideration

1. Need to conserve and upgrade economically important breeds like Sahiwal of cattle, Jamunapari and Beetal of goat etc by Government institutions with provision of sufficient fund from Central and State Government.
2. To protect the interests of small farmers, provision of various technologies through cooperative societies needs due consideration.
3. ICAR must provide financial support to Farmer Oriented National Societies for organizing annual meets.
4. To create awareness among masses celebration / organization of World Veterinary Year, World Veterinary Day, camps and similar functions should be a regular feature.
5. Some of the institutions recognize the participation in seminars, only on the basis of oral paper presentation, whereas, both oral as well as poster presentations have same impact and value. This type of classification by the organizers is usually done keeping in view the constraint of time. Therefore, ICAR may circulate the guidelines to all the ICAR institutions and SAUs that equal weightage shall be given to both type of presentations.

SAUs / ICAR Institutes consideration

6. Research in Livestock Production Management should be management oriented particularly in the areas of Animal Behaviour, Welfare, Cost and Comfort effective housing, waste management, feeding management, reproductive and health management including transportation; production, preservation & storage of feed/fodder and handling of milk at the farm.
7. There are plenty of unconventional feed resources, so their potential in livestock feeding should be worked out to reduce cost of milk production.
8. Development of environmentally and women oriented Animal Husbandry Technologies is the need of hour.
9. Research on integrated model comprising of Dairy/Piggery/Poultry (or combination) on co-operative basis.
10. Regular Scientist-Farmer interactions shall be organized to have the feedback and address their problems through research and in collaboration with Directorate of DEE with the help of mobile vans on co-operative basis.

State Animal Husbandry Department consideration

11. Animal welfare schemes shall be strictly implemented.
12. Concept of organic products needs to be further propagated in the prospective areas.

VCI consideration

13. Course curriculum related to Livestock Production Management needs thorough review and appropriate modifications.

General considerations

14. A representative from the concerned societies may be included in working groups for planning of policy matters at national level e.g. XIIth Five Year Plan etc.
15. Due consideration should be given to livestock sector for fund allocation and plan priority on the basis of GDP /SDP contribution from the sector .
16. Livestock sector has a significant role for socio-economical upliftment of rural poors, so both central and state govt. may give due attention to this sector.

6.

**National Seminar on “New Paradigms in Livestock Production:
From Traditional to Commercial Farming and Beyond”
National Dairy Research Institute , Karnal,Haryana
Jan 28-30, 2013,**

1. Transformation of traditional production systems to commercial system should be cost effective, sustainable and environment friendly. Resource flow in terms of adequate budgetary allocation & technological backstopping in terms of quality germ plasm and the management strategies along with trained human resources should be ensured to make it possible. R&D efforts on these aspects must be strengthened.
2. Since traditional system would continue to be the mainstay of a large majority of our farming community, we need to continue working on integrated mode of food production and maintain the common property resources to sustain livelihood of small holders.
3. Targeted efforts must be directed to improve the availability and quality of feed nutrients to the animals. Technology modules involving strategic supplementation of feed additives and limiting nutrients must be designed to improve productivity as well as the quality of the produce and to minimize health problems in livestock.
4. Research efforts on reproductive bio-techniques like sexing of semen, ovum pick-up, cloning etc., should be strengthened. Other areas of reproduction like advancing sexual maturity, oestrus detection, behavioral cues, to metabolic and reproductive disorders need to be given due priority for research.
5. Animal welfare issues need serious attention of all concern in commercial livestock production. Research on this aspect should be strengthened. Modules need to be developed for objective quantification and monitoring of animal welfare and comfort for the typical Indian agro-ecological and socio-economic conditions.
6. There is a need to develop eco-friendly and cost-effective shelter designs for different livestock production systems and different agro-climatic regions. The use of already available technologies for the mitigation of thermal stress should be promoted & the incentives provided for the adoption of climate resilient shelter and management

strategies. Further, the awareness campaigns need to be undertaken for making the livestock keeper aware of climatic change impact and strategies for its mitigation.

7. Non-ruminant and poultry have to be given due importance owing to their contribution in ensuring livelihood and nutritional security of large chunk of population. Backyard and small holder production should be encouraged in areas where commercialization is not possible.
8. Technology backstopping must be provided to ensure quality milk production. HACCP and TQM concepts must be integrated with the commercial livestock production activities.
9. Bio waste management should receive top priority for any traditional or commercial livestock farming activity. These strategies must be directed at minimizing the environmental impact and energy conservation.

7.

National seminar on “New Dimensional Approaches for Livestock Productivity And Profitability Enhancement Under Era of Climate Change”.
Anand Agricultural University, Anand,
Jan 28-30, 2014

Extension (Farmers) Consideration

1. There is need of propagating integrated-diversified farming for optimizing resources as well as environment polluting wastes.
2. There is need for accommodating small farmers herds/flocks as a temporarily during extreme climatic conditions or on long term basis in the form of animal camps or hostels for optimizing animal productivity, improving service delivery, improving sanitation and hygiene in farmer houses etc
3. Development of appropriate extension methodology for technology transfer pertaining to value added products of production as well as marketing.
4. Need for selection of time, duration, place and trainer considerations in extension and training farm women.
5. Promotion of urea enriched feeds in different forms, technology for utilization of unconventional feeds and forest outputs.

Scientists’ consideration

1. Economics and practicability of eco-friendly farming of small farmers
2. New feeding techniques during extreme climatic conditions, like probiotics for reducing methanogenesis.

3. Creation of “incubation centers” for laboratory testing of new equipment and technologies for value added production, farm management, product technology and methodologies for alleviation climatic stress.

VCI consideration

1. Diversified and integrated farming
2. Welfare of livestock *vis a vis* normal and abnormal (stress induced) behavior.
3. Precision (area and community specific) farming system and extension methodologies for propagation of the same
4. Gender issues in small livestock production.

Overall Consideration

1. Advantage of indigenous breeds vs. crossbreeds in small farmers holdings under climate change conditions is strongly felt.
2. Ways and means of temporarily (adverse climate and long term conglomeration of animals of individual farmers into farmer friendly bigger conglomerations at village level. There is need for incorporating above aspects in BVSc course curriculum.
3. The oft recommended fodder bank has to be revisited – chain of small fodder banks working in coordination in given area rather than centralized bigger ones.

8.

National seminar on “Livestock Production Practices for small farms of marginalized groups and communities in India” Central Agricultural, University, Selesih, Aziwal, Mirzorum, Jan 28-30, 2015

LIVESTOCK PRODUCTION PRACTICES FOR SMALL FARMS OF MARGINALISED GROUPS AND COMMUNITIES IN INDIA

1. Recommendation on backyard chicken production: Backyard poultry has a huge scope for livelihoods in North East states including Mizoram and people are gradually getting interested to multipurpose desi strains for which supply chain of the seed and machinery for incubation has to be setup in large areas. Hence, expansion mechanism needs to be strengthened.
2. It is recommended to setup a mechanism where in multiple cost effective hatching units need to be established to self sustain the seed production. The “model village” pattern can be adopted, where the village as a unit can be fully supported with one viable strain of backyard poultry to improve the livelihoods.
- 2.1 Draftability and adoptability of Yak is better than horses and mules in high altitudes of 3000 m above of the mean sea level as the scientific finding denotes that Yak can carry more loads than the mules and horses

- 2.1.1 Easy movement across/along hanging bridges and narrow roads due to its anatomical structural abilities and visionary abilities.
- 2.1.2 Fearlessness during explosions
- 2.1.3 Adopts and survivability to inclement weather and related changes in the weather
- 2.1.4 Low man power requirement for the management of yak compared to horses, hence management is economical
- 2.1.5 Considering the facts on the abilities of yak in comparison to horses and mules, it is recommended that Yak is good pack animal in marginalized areas and high altitudes with better adoptability and survivability, potential work and drought contributor.
- 2.1.6 To request the chief of Army, India to start Yak units along with RVC Units and dog Units for serving the defense and sensible border areas as a pack animal.
- 2.1.7 It is also recommended to the Tourism departments in the marginalized areas to promote the Yak while carrying the luggage and tourists to higher altitudes.
3. Characterization, documentation of production and reproduction potential and development of strategies for conservation and value addition of utility values of native species and emerging breeds of marginalized areas in North Eastern region states are the prioritization of the research focus of the ICAR institutes (NBAGR) in collaboration with state agricultural and veterinary universities, line departments and farming community. The emerging and highly potential breeds like Manipuri horse, Zovawk pig, Kathiawadi goat, Ultra Fowl etc.
4. Prioritization of the research areas on the characterization, documentation of production and reproduction potentiality, value addition of the local species and breeds due to their inherent abilities in ICAR and state university.
5. Protection and promotion of the natural feeding resources in North East region states is essential. The technologies and policies are to be developed. Transformation of feed and fodder ingredient from mainland to the marginalized area is the major constraints for feeding of livestock in turn for the development of livestock sector in the region.
 - 5.1 It is recommended to the categorize the feed manufacturing units of the region under “Agricultural Sector” for extending the provision of subsidy support towards the feed ingredients procurement, transportation and subsidized tariffs of electricity.
 - 5.2 **Wear House”** and **“Cold Storage”** units are to be established for the storage of feed ingredients and livestock product includes meat, milk etc. Large scale feed manufacturing industry need to be established in Public Private Partnership Mode to reduce the overhead on the transportation and make sure to supply the livestock feed and fodders continuously throughout the year without much fluctuation in the prices.
6. Exploration of newer feeding resources can be explored through adaptation of rapid and accurate feed analysis method using Near Infrared Reflectance Spectrometry (NIRS), by establishing laboratory models in all the ICAR, Veterinary Research Institutes, Vety

- colleges and portable models for the progressive farmers. The utilization of NIRS for the value addition of livestock product like pork and other meats can also be exposed.
7. The research organization can focus on the cost effective, species specific, weather adoptive, eco friendly and self cleansing kind of housing models in collaboration with the expertise the expertise from the domain areas of Civil Engineering and Design institutes of the country.
 - 7.1 Most of the livestock in the North Eastern Region are reared utilizing the natural resources and using least chemicals and fertilizers. The livestock produce of the region may be certified as “Livestock Produce Using Nature and Natural Resources” and can be marketed in the main lands of the country as “ Produce from NE region” for higher price due to its Organic meat of production.
 - 7.2 Indigenous milk, meat products with higher medicinal and appetite values can be focused for the patents through organizations like “ National Innovation Foundation” wherein the innovators will be getting the patents and indigenous products can be sold for higher prices at mainland. The initiatives are needed from Marketing Agencies line departments and Non government agencies.
 - 7.3 **Niche marketing system** is suitable to enhance the marketing price and link of the produce from NE Regions.
 - 8 A concrete and concentrated efforts are required in R & D to develop and disseminate the package of practices for overall development of productivity and health of livestock species in general and piggery in particular.
 9. It is recommended to focus all the governmental support for livestock development involving the active women groups. The involvement should not be confined to the activities as it is happening now, but also should be extended to financial empowerment. Area specific species approach while supporting women oriented projects is required.
 10. Training programs also should be aimed to transfer technologies to the women groups by hand on experience as well of the attitudes of the women including the basic livestock education. (Extension Educations Units)
 11. Integrated systems of livestock farming including the utilization of waste in to edible products are the promising area of the region. There is a need to establish a model farming system in the institutional areas where the training areas being conducted to farming community.
 - 11.1 to request the commissioner, animal husbandry to seriously focus the plans and strategies for rehabilitation of stray cattle (nearly 22 million as per the livestock census, 2012) as a priority area.
 - 11.2 To request once again on the establishment of “ Project Directorate on Livestock farming Research” to focus on the integrated studied on the augmentation of livestock production through ecofriendly and enrichment of the indigenous strains and species of the livestock
 - 11.3 To request all the state chief ministers, minister of agriculture and animal husbandry directors, department of animal husbandry to develop the “ livestock vision document” for

achievement of livestock development, livelihood security and conservation of biodiversity of the pride states of the country.

- 11.4 The society will address all the nodal agencies involved in the development activities concern to the livelihood sectors in the North Eastern Region.
- 11.5 The society will address the chief of army, tourism departments to start the yak breeding centers and unit for making use of them as a pack animal due to their higher potential inherent values.
- 11.6 The society will request commissioner of dept. dairy or animal husbandry, GOI, North Eastern States Honorable Chief ministers, minister of Agriculture and Animal Husbandry, Directors of the line departments to focus on the “livestock development vision document” aimed improving the livelihoods and enhancement of livestock biodiversity and population in the region
- 11.7 The technical and scientific recommendations will be submitted to the ICAR and state agricultural and veterinary institutes on the prioritization of the research and setting up nodal agencies on novel marketing approaches of “Niche marketing”.
- 11.8 The organizations working on the animal welfare issues will be sensitized and requested on the fate of “Stray Cattle” as the seminar strongly felt the issue of rehabilitation and rejuvenating these animals is the most prioritized resolution of the National seminar, Aizwal apart from the above mentioned prioritized issues.

9.

International conference on “Innovative designs implements for global environment and entrepreneurial needs optimizing utilization sources”

Organised the Southern Chapter of ISAPM (Ag/Vet Univ & ICAR Institutes)

At PVNR Vet & Anim. Sc. University, Hyderabad

Jan 28-3, 2016

TS - I: Animal Welfare, Behaviour and Ethics

1. The terms „Animal Welfare“, „Animal Behaviour“ and „Animal Ethics“ have to be clearly defined with respect to commercial and small farmer livestock production at appropriate fora and by agencies not only at the Indian national level but at the regional and World levels.
2. Combining tradition with modern technologies, production systems have to be developed for different agro-geo-climatic zones keeping in mind the farmers“ goals, namely – welfare, conservation, commercial production, livelihood security etc.
3. Standards or codes of animal welfare measures for each system, species and scale and nature of farming have also to be developed by such fora.

4. Crucial is deciding on the appropriate agencies at provincial and national level that would monitor implementation of such standards with some statutory authority to decide on the steps to be taken when such standards are violated.
5. Importance of animal welfare, behaviour and ethics have to be regularly conveyed to the farmers via appropriate means – media, training, meetings, demos – so that everyone is aware of the importance of contented animals for good production.
6. Similarly veterinarians, para-veterinary staff and all others concerned with livestock have also to be educated and given refresher training on a regular basis.
7. Indigenous knowledge and technology with respect to animal welfare have to be collected in an unbiased and unambiguous manner, recorded and conserved for the benefit of the future generations.

TS II: Changing Climate- Global Perceptions on Indian livestock Production systems towards the Global Warming

1. Development of “green” livestock production systems based on reduction of enteric methane genesis mainly through manipulation of feeding and thermal ameliorator housing and management for livestock and poultry is the recourse available to livestock farmers in India.
2. There is considerable scope for developing region and breed/type/species specific fodder varieties resilient to extremes of weather, especially in the vast dry regions of the country, and cultivable round the year. Packages of environment friendly soil, water and crop management have to be developed and transferred to the farmers. In this legumes – wild, existing or newly developed are crucial.
3. Adoption of nutrition-feeding strategies like – inclusion in rations of oils and fats, certain chemicals, plant secondary metabolites, probiotics, use of fortified complete feed blocks, total mixed rations, newer feeds screened for suitability via Near Infrared Reflectance Spectroscopy, phytogenic feed additives (common Indian herbs and spices), use of intraruminal hydrogen sinks, „vaccination“ against rumen methanogenesis etc.
4. Exploration of proper carbon sequestration strategies, shelter and waste management to reduce impact of climate change on livestock production.
5. Need for undertaking extension and services to ensure implementation of such measures at small farmer livestock farms that abound in the country.

TS – III: Precision Livestock Farming-Commercial models vis-a-vis small holder production systems:

1. Use of Precision tools for enhancement of livestock productivity by optimizing the resources by central and regional organisations but involving small farms too.
2. Area specific adoptable technologies for overall development of livestock production, especially that of small farmers and small ruminants.
3. Woman oriented livestock farming with technical inputs in the form of methods such as Near-Infrared Spectroscopy etc., to give the estimation of feed input values so as to go for improved feeding systems.

4. Training programmes for women should be practical oriented, considerate to their perceptions and convenience (venue, time and trainer profile wise).
5. Undertaking necessary departure from conventional ToT approach – recommendations should be situation and area specific and socio-economically adaptable. Soil management has to be part of such activities.
6. There is a big need to study livestock production considering prevailing main and secondary systems in different areas and with different socio-economic strata. A country wide database of such information has to be developed.
7. Need for in-depth understanding of the reasons for low level adoption of scientific recommendations and technologies, perceptions of women farmers, and involving farmers in research programmes from the beginning.

TS – IV: Information Technology in Livestock Production

1. It was felt that very little usage of the revolutionary Information Technology Sciences is made in the field of livestock production and management, which has to change well and soon.
2. The scope for this is vast – use of Decision Support System and Expert Systems to develop actionable advisory to livestock farmers.
3. The deliberations held in the session reemphasized the need of awareness creation about various improved technologies available and the importance of making them more accessible to the needy farmers.
4. It was also felt that the Spot Learners should be encouraged through modern gadgets in making the technologies more accessible.
5. E-learning technologies for veterinary students as well as farmers, livestock behaviour monitoring and welfare via sensor-based technologies, automation in livestock management practices, modern technology support in livestock product manufacture, market information system and database creation in breed conservation, grazing/feed resources etc. are seen as actionable practices for the country, in fact other developing countries.
6. Research is needed into animal identification based precision livestock farming, especially animal health care, via web and mobile based two-way livestock information systems. In this, and in view of the rural illiteracy, utilisation of services of educated rural youth is seen as a distinct possibility.
7. On the one hand, there is need for developing appropriate curriculum mapping tools and using learning analytics, while on the other hand, the need for creation of awareness, accessibility and availability of information among scientists, field officials and farmers.

TS-V: Livestock Physiology, Nutrition and Feeding

1. The session focused on the advanced technologies and concepts like nutraceuticals, feed supplements, hydroponics, housing models in relation to environmental zones, management of feeding schedules etc., and recommended the concept of adopting the non-conventional feeding approaches to mitigate the nutritional deficiencies.

2. Indigenous breed promotion to resist the effect of environment on production and boosting the research through improved funding on production improvement and also giving importance to make them reach the farmers.
3. While a lot of information on nutritional features of indigenous livestock, indigenous feeds, processes, feeding techniques, fodder cropping and dry fodder enrichment methodologies are available within the country, there is need for orderly compilation of the same *de novo*. More crucial is our inability to carry the same to the farmers properly and, to some extent, to the feed industry.
4. Demonstrations of such processes at the farmers' farm level are not to the same extent as that seen in the agriculture (crop farming) sector. We have to improve this situation.
5. Location specific feeding systems, mineral mixtures and feed supply linkages have to be developed to obtain optimal average daily weight gains and production of local livestock have to be developed.
6. Feeds and feeding techniques have to be eco-friendly aimed at minimal enteric methane emission.

TS-VI: Livestock genetics and Breeding

1. The deliberations were held on the bio technological approaches for efficient livestock production and management, genomics etc. The need of creation of genomic research teams was recommended.
2. Collaborative studies among institutions with emphasis on extension and other related fields are suggested to be undertaken to give the technological advances a farmer's orientation.
3. Making the conservation data as precise and as valid as possible, especially in *in-situ* conservation and creation of appropriate data base are essential.
4. There is a lot of scope for creations of breed conservation infrastructure on scientific basis, including appropriate training of workers and farmers on the procedures and protocols to be followed.
5. We are much behind in use of molecular level information and procedures in breed conservation and improvement that needs correction as early as possible.
6. Inter-state and international collaborations are required for making genetic improvement of livestock and poultry in the fields of exchange of information, experiences and genetic material.

TS – VII: Livestock Reproduction Management

1. The session deliberated on the recent protocols on the synchronization of estrus, embryo transfer technology and traditional and new solutions to overcome reproduction disorders of buffaloes and other livestock.
2. It was resolved to recommend the maintenance of superior germ plasm and elite bull mother farms to improve the reproductive efficiency and advised to take the same on area specific basis. In this the physical, physiological and sterile (infection wise) nature of the semen to be assured by following orderly protocols.

3. Enhancing reproduction efficiency in livestock in general and buffaloes and high yielding cows in particular, have to be based mainly on rectifying nutritional and feeding related issues discussed in the other Technical Sessions. Measures of balanced rations, complete feeds, green fodders including legumes, areas specific mineral mixtures, overcoming micronutrient imbalances were suggested.
4. In dairy animals, especially buffaloes, inadequacies in heat detection and insemination at the appropriate time(s) and overcoming these issues by appropriate management have been suggested, as this is the single most common concern. This calls for better outreach and quality of insemination service in the villages.
5. Also considered are the measures of early diagnosis of infertility due to specific and non-specific causes and overcoming the same by appropriate measures.

TS – VIII: Livestock Health and Emerging diseases

1. It was recommended that India's age old proven ethno veterinary practices may be put into practice and also to reduce the use of antibiotics indiscriminately.
2. Need, and ways and means of assuring biosecurity and control of emerging diseases, creation of value chain systems, following the principles of risk analysis, hazard identification, risk assessment, management and communication were emphasized.
3. Because of wider acceptability and coverage (outreach) and economic reasons use of various Indian (*Ayurveda*) and traditional herbs and biotech products – ethno-veterinary practices – that have a remedial effect for the need to be widely used, especially in the light of excessive use of antibiotics that affect product quality as human food, besides building up undesirable antibiotic resistance.
4. The herbs *Tulsi* and *Turmeric* supplemented @ 0.5% and 0.4% respectively are effective in mitigating the changes in blood constituents induced due to heat stress. Feeding 1.9% condensed Tannin through oak leaves based diets reduced gastrointestinal nematode loads in goats without any adverse effects.
5. A thorough database and „dos“ and „don“ts“ as regards wide usage of antibiotics and anthelmintics has to be developed and made accessible to all veterinary practitioners.
6. Main recommendations of the session are –
 - a) *India*: Indiscriminate use of antibiotics in treating infectious diseases needs to be stopped. Foot-rot in sheep caused by *Dichelohacternodous* needs further extensive investigations to contain its spread.
 - b) *Asia*: Scientific validation and documentation of Ethno Veterinary Practices used in the field needs to be done.
 - c) *Global*: Emerging diseases need to be identified and categorized as a hazard, the risk and loss has to be assessed, and proper management policies need to be formulated and also communicated and put in practice among the farmers to avoid its further spread to other states and nations.

TS – IX: Value addition, Post production technologies and Economics

1. The session emphasized and recommended the analysis of pesticide residues in the livestock products so as to make them more market acceptable. The development of simple farmer oriented and easily adoptable technologies are agreed to be the need of the hour.
2. It was found that residues of pesticides like Endosulfan were not found in milk and milk products analysed in Chittoor dist of A.P; where as in Rajasthan 0.6 per cent of milk samples had shown above MRL values for organochlorine pesticide residues, and in the feed and fodder very low concentrations of BHC while chloropyriphos in milk samples analysed in Gulbarga district of Karnataka. Hence all India standard protocols have to be designed in this regard,
3. It was recommended to create a nationwide data base of levels of pesticide residues to create consumer awareness. International health standards are felt to be achieved to give Indian livestock products a global brand.
4. Weaning of piglets at 40 days is better (in terms of obtaining better carcass quality). In fact, economic importance of value of weaning and management fattener pigs and small ruminants as well as post-production technologies of animal produce and utilization of animal products were suggested for revisiting and deciding for each region.
5. Post milking teat dipping can be effectively used to reduce the somatic cell count in milk and to increase the daily milk yield marginally.
6. Conditioning of poultry excreta improves the bio-gas production efficiency-so farmers can establish simple bio-gas plant and produce bio-gas at cheaper cost.
7. Some feeding manipulations that can result in better yields are – a) Feed incorporated with poultry carcass meal giving good results in their performance and economical also; b) Supplementation of Alovera powder at the rate of 0.5 % yielding better growth and carcass composition of broilers. c) Dietary supplementation of curry leaf or turmeric powder in combination with linseed oil to broiler chicks for six weeks. d) Rabbits rised with 5 % spirulina and 3% thyme supplementation yielded better wool quality.
8. Adoption of simple processes the livestock produce like meat and milk into various value added meat and milk products that give higher profits.
9. Similarly practicable methods of organic livestock farming, use of traditional cow dung-urine based organic plant elixirs and pesticides, have to be propagated widely.
10. Simple and farmer friendly technologies have to develop for conversion of livestock produce into value added livestock products which increase the profits to producers and also benefit to consumer.
11. Provide the curriculum regarding the different post production technologies of livestock produce, marketing and economics. Better and simple scientific management methods adopted at rural level that increase the economic status of the producer. Implementation of technologies is very important - identify those technologies and motivate the farmers for adoption of technologies in appropriate channels.
12. A national wide data base has to create for pesticide and toxic residues entering into different livestock products.

TS – X: Veterinary Education-Indian and global perspectives

1. The session deliberated on various components of imparting the education to not only the students but also to the farmers, trainings and hands on skill development.
2. Suggested steps were – a) Massive open online courses on knowledge „cloud“ mode; b) Digitalization of veterinary libraries and other knowledge sources; c) Fine-tuning veterinary curriculum to meet challenges of Indian livestock farming and industries, which should also take into consideration of the perceptions of the immediate past veterinary students towards e-learning; d) Classrooms to be well equipped for e-learning for individual students.
3. Veterinary and animal sciences subject wise professional associations too have to play a key role in formulation of veterinary curriculum with national, regional and international perspectives. This came into focus based on discussions on presentations about veterinary education systems in UK, USA and Europe in comparison with that in India.
4. Veterinary education system has to act as a motivation force for the students rather than preparing for a salaried job only. For a similar reason continuous education and refresher courses have to be standardized and regularized for field veterinarians for the country as a whole. In this care has to be taken of professional needs specific to the regions.
5. At present examination of MVSc students is based on his/her work and theory, which should be made more practical based, like knowledge of facing different field/professional situations.
6. Research emphasis has to be more on producing livestock products of good quality and quantity based on a consortium basis – cooperation across departments.
7. The perennial problems of shortage of infrastructure and manpower resources in veterinary and animal sciences Education, Research and Development organizations has to be solved in near future, on installment basis to begin with.