



INDIAN AGRICULTURAL UNIVERSITIES ASSOCIATION (IAUA)

Conference and
11th National Symposium

**Positioning NARES for
Vocational Education**

28th & 29th May 2016



Organised by

Madras Veterinary College

Tamil Nadu Veterinary and Animal Sciences University

Chennai – 600 007, India



**Indian Agricultural Universities Association
Sponsored 11th National Symposium on
“Positioning NARES for Vocational Education”
28th to 29th May 2016**





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(IAUA)**

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Tamil Nadu Veterinary and Animal Sciences University
Chennai – 600 007, India**



Prof. M.S. SWAMINATHAN

Founder Chairman and Chief Mentor, UNESCO Chair in Ecotechnology
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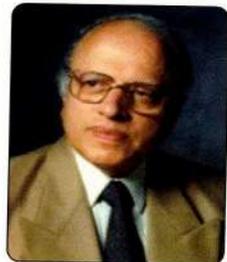
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M S Swaminathan Research Foundation

Center for Research on Sustainable Agriculture and Rural Development



FOREWORD

India has been a pioneer in the establishment of agricultural universities based on the land grant principle enunciated by Abraham Lincoln in USA over 150 years ago. We now have 63 agriculture universities, several of them being devoted exclusively to animal sciences, fisheries and horticulture. Agriculture universities particularly the early ones like those established in Ludhiana and Pant Nagar have played a key role in bringing about the green revolution in our country. The Indian Agriculture Research Institute, New Delhi which is also a Deemed University has been the mother of the agriculture university system in the area of faculty development and research capacity building.

The first veterinary university was established by Tamil Nadu and TANUVAS today occupies a pride of place in our agriculture university movement. It has been an act of wisdom on the part of the Vice Chancellors of Agriculture Universities have joined together to establish the Indian Association for Agriculture Universities. This association is playing an important part in facilitating sharing of knowledge and experience among farm universities. In this context, I am happy that this association is organising a national symposium on positioning of NARES for vocational education. Vocational education is the Gandhian method of combining intellect with labour or brain and brawn. I hope the symposium will help to prepare a roadmap for further human resource development based on learning by doing. I congratulate the Association for choosing this topic and wish the symposium great success.

Sd. PROF M S SWAMINATHAN





KAMDHENU UNIVERSITY
Gandhinagar – 382 010, Gujarat, India

Prof. M.C. VARSHNEYA
Vice- Chancellor



MESSAGE

The national Symposium of IAUA being organised from 28th to 29th May, 2016 at the esteemed Madras Veterinary College Campus, TANUVAS, on the theme “Positioning NARES for Vocational Education” is a welcome step amidst futuristic landscape of “Skill Development and Skilled India”.

This IAUA meet is a think tank which can undertake visioning exercise and position NARES for vocational education supporting the “Farm to Fork” paradigm.

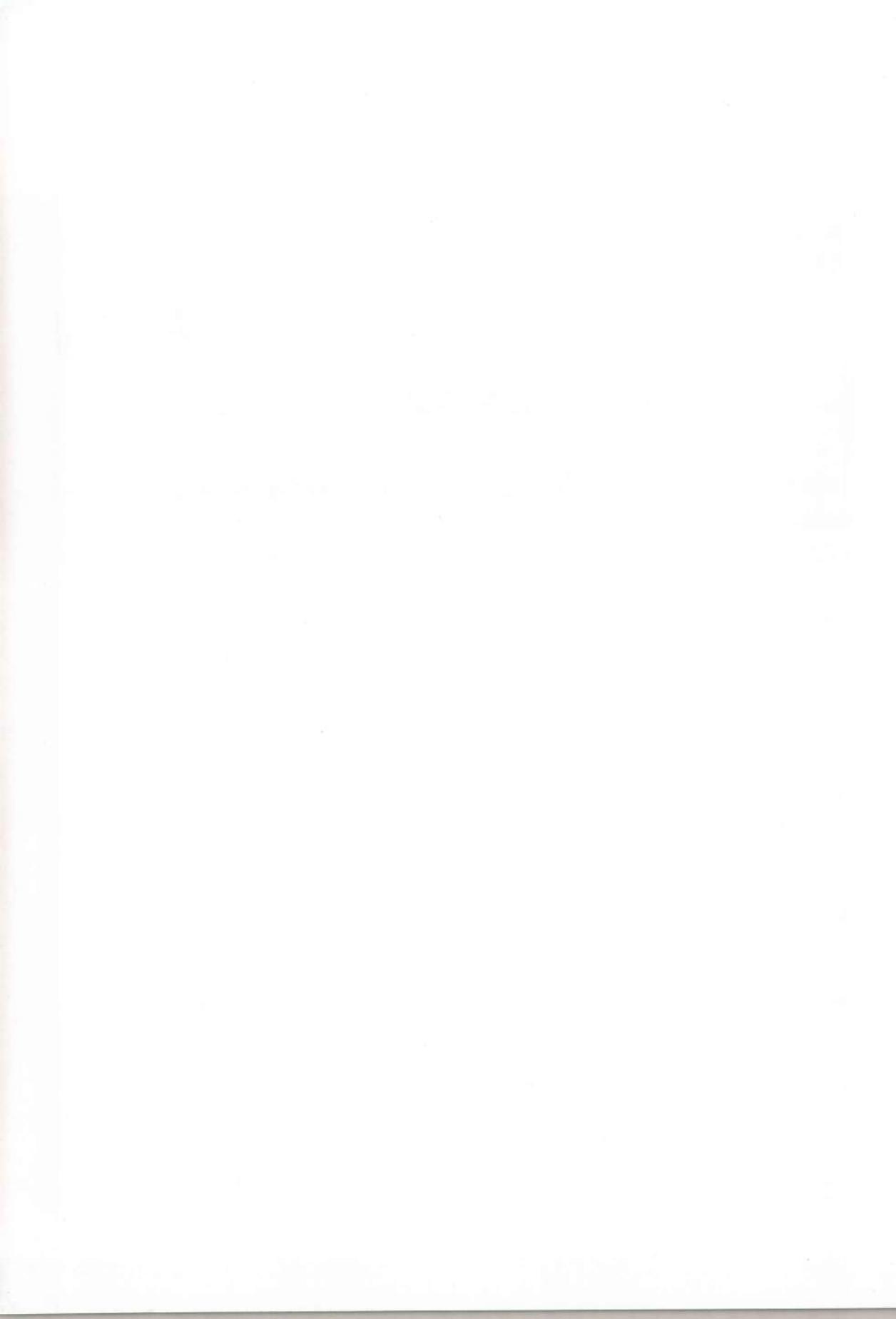
The subtheme on integration of skill development and polytechnic programmes in vocational education can be a flashpoint, connecting the missing link and providing place-based institutional sustainability of agri-practices.

I am sure the elite gathering of educational leaders will assess the educational and research trajectories at hand and draw sectoral road maps for vocationalization of agricultural education and thus survival of a marginal and small farmer.

I wish outstanding success to this event, thus streamlining the future NARES pathways.

Jai Hind.

Sd. M.C. Varshneya





TAMILNADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY

Chennai –600 051, Tamil Nadu, India

Dr S. Thilagar

Vice- Chancellor



MESSAGE

The 11th National Symposium of Indian Agricultural Universities Association and Vice-Chancellors meet is being organized by Tamil Nadu Veterinary and Animal Sciences University at Madras Veterinary College campus on 28th and 29th May, 2016. '**Positioning NARES for Vocational Education**' is the theme of the 11th National Symposium. It gives me great pleasure in organizing these events at a time when TANUVAS has been ranked 36th amongst the National Universities and 3rd among the State Universities. Among the 12 State Veterinary Universities of the country, we have been ranked number one.

The Symposium with five technical sessions will deliberate on sub-themes, Mainstreaming Agricultural education for vocational education, Integration of skill development and polytechnic programmes in vocational education, Contribution of livestock, poultry and fishery sectors on employment generation, Orienting agricultural research for vocational education and Role of agricultural extension in vocational education.

With the active participation of a galaxy of learned, eminent academicians, I am very confident that the outcome of the Symposium will go a long way in planning and prioritizing the strategies of NARES for the benefit of the stakeholders. I take this opportunity to thank the IAUA for reposing faith on TANUVAS and permitting us to organize this all important symposium.

Place : Chennai – 51

Date : 20-05-2016


(S. THILAGAR)
VICE-CHANCELLOR



Acknowledgement



We gratefully acknowledge the
sponsorship provided by the
Indian Agricultural Universities Association (IAUA),
New Delhi

for the conduct of 11th National Symposium on the theme
"Positioning NARES for Vocational Education"



INDIAN AGRICULTURAL UNIVERSITIES ASSOCIATION

11th National Symposium on "Positioning NARES for Vocational education"

28th & 29th May 2016

TANUVAS, Madras Veterinary College, Chennai

RECOMMENDATIONS

1. Steps need to be taken to curb mushrooming of private agriculture colleges in the country.
2. Popularising millet cultivation for nutritional security, resilient crops and reduce carbon foot print in livestock farming and technological development for mechanization in major horticultural crops.
3. Skilled Development Programmes-Based on employability and demand potential to be identified in a scientific basis-Offering vocational training using polytechnic courses in crop production, animal husbandry, fisheries, farm machinery and food industry with financial support of Union and State Governments with uniform course content as possible with flexible option under bodies like ICAR, VCI etc. Level I KVKs, Level II SAUs
4. Improving entrepreneurial skills in students which should enable conservation of resources and overcome seasonal unemployment.
5. Conservation of indigenous crops/breeds with their role in agricultural and livestock farming
6. Focus on genetic screening of livestock, embryo sexing and semen sexing
7. Improved "Service delivers" for all sectors especially for pig farming.
8. Establishing linkage to local demand and equal gender involvement.
9. Technology Business Incubators: 'Start-ups' - Rural Vet Pharma involving Indian medicine, small farm machinery workshop etc. with IAUA to formulate a policy to develop a sustainable model of incubation centres.
10. To go for quality publication for better impact than quantity



Tamil Nadu Veterinary and Animal Sciences University

INDIAN AGRICULTURAL UNIVERSITIES ASSOCIATION

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5. Dr.S.Rajalakshmi (a) Radabai, AP, VMC, MVC

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- Members** : 1. Dr.T.A.Kannan, Warden, MVC Hostel
2. Dr.G.Balakrishnan, Officer in-charge, Guesthouses



Catering

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Director, Centre for Animal Health Studies,
TANUVAS, Chennai

Members : 1. Dr.V.Appa Rao, Professor, LPT (MS), MVC
2. Dr.A.Gopinathan, AP, AGB, MVC

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TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY
IAUA SPONSORED



11th National Symposium on
"Positioning NARES for Vocational Education"
28th & 29th May 2016



May 28, 2016

Inaugural Function : 10 00 - 11 30 hrs

Time	Details	Speakers
10 00 - 10 05 hrs	Invocation	
10 05 - 10 20 hrs	Welcome Address	Dr. S. Thilagar Vice-Chancellor, TANUVAS
10 20 - 10 30 hrs	Lighting of lamp	
10 30 - 10 45 hrs	Introductory Remarks	Dr. N.C.Patel Secretary, IAUA
10 45 - 11 05 hrs	Address by Guest of Honor	Dr. Narendra Singh Rathore Deputy Director General (Edn.), ICAR, New Delhi
11 05 - 11 25 hrs	Presidential Address	Dr.M. C. Varshneya President , IAUA
11 25 - 11 30 hrs	Vote of thanks	Dr. C. Balachandran Organizing Secretary Dean Madras Veterinary College
11.30 – 11-35 hrs	National Anthem	
11 40 hrs	Tea Break	



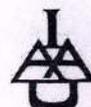
Tamil Nadu Veterinary and Animal Sciences University

**TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY
IAUA SPONSORED**



**11th National Symposium on "Positioning NARES
for Vocational Education"**

May 28th - 29th, 2016



INAUGURAL PROGRAMME

Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) organised Indian Association of Agricultural Universities (IAUA) sponsored 11th National Symposium on the theme "Positioning NARES for Vocational Education" on 28th and 29th May 2016 at Madras Veterinary College, Chennai. Dr.Narendra Singh Rathore, Deputy Director General (Education), Indian Council of Agricultural Research, New Delhi, Guest of Honour delivered special address. Dr.M.C.Varshneya, President, IAUA presided over the function. Dr.N.C.Patel, Secretary cum Treasurer, IAUA gave introductory remarks. Dr.S.Thilagar, Vice-Chancellor, TANUVAS welcomed the gathering. Dr.C.Balachandran, Organising Secretary and the Dean, Madras Veterinary College, Chennai proposed vote of thanks. Twenty three Vice-Chancellors and accompanying officers participated in the symposium.

There were five Technical Sessions which focused on the sub-themes on the role of education, research, extension education, skill development, polytechnic programme and employment opportunities on vocational education. More than ten presentations and panel lists views were made during the symposium.





Day 1 (28.05.2016)
Technical Session I

**SUBTHEME: MAINSTREAMING AGRICULTURAL
EDUCATION FOR VOCATIONAL EDUCATION**



THE
TECHNICAL

STATE OF MASSACHUSETTS
COMMISSION FOR VOCATIONAL EDUCATION

RESOURCE REQUIREMENT FOR AGRICULTURE'S REJOICE HUMAN RESOURCE NEEDS FOR AGRICULTURE AND ALLIED SECTORS

Dr. K. Ramasamy

Vice-Chancellor

Tamil Nadu Agricultural University, Coimbatore 641 003

All the subjects to flourish ever require resources on a constant mode and agriculture is not an exception. The resource requirement varies with time, quantity and quality for various operations that encompasses agriculture. Agriculture as a profession mainly needs man, material and resources to excel and the requirement of human resources for promoting agriculture remains as a main stay. Human resources need for agriculture can be mainly classified based on the requirement as 1. Qualified teaching community 2. Effective research faculty 3. Enduring extension functionaries for transferring agricultural research output 4. Enthraling student community 5. Efficient base workers and 6. Encouraging farmers. All these human resources can be effectively molded by exceeding performance of any Agricultural University in the country.

Enhancing the output in agriculture effectively depends on the development of excellent human resources with static understanding of the basic concepts and its dynamic application to resolve present day problems. On the front of producing agricultural graduates, Tamil Nadu Agricultural University (TNAU) stands atop. A statistics shows that the existing education system is producing about 24,000 graduates per year with crop sciences contributing 2/3rd of it. The projections indicate that by 2020, the annual outturn required would be about 54,000, i.e. the demand supply gap would be 30,000. Discipline-wise, the additional annual requirements of outturns are expected to be: Agriculture 9335; Horticulture 7153; Forestry 1116; Dairy 3005; Veterinary & Animal Husbandry 4989; Fishery 2181; Agriculture Engineering 1749; and Agri-Biotechnology 305. As need for agricultural graduates grow, it can be met from the existing colleges with improved strength. Graduates thus to be produced must have the holistic perspective of agriculture with a mission of global thinking and visioning at local level. Rather than producing the graduates as a biological machine, they have to be made to understand the present scenario of farming, farming being practiced in other countries, legacy of farming and have to be made to innovate newer farming methods.

As many of the students entering at Undergraduate level are from rural area, training them in the modern practices of farming through regular



curriculum requires intervention on the part of teachers. A teacher, who has been molded by an excellent teacher during his curriculum will definitely excel in the profession of teaching. Teaching as a noble profession primarily requires passion and patience and teaching agriculture in addition requires compassion and eminence in teaching. Agricultural practices being followed in all the States of India may not be uniform which essentially requires an exposure of students to varied practices being followed in different States. In this case, a link between SAUs of South with North and East with West would be helpful in exposing the students to varied agricultural practices being followed. Students' curriculum can be designed in such a way that students between the different SAUs can be exchanged for one or two trimesters to understand the system being followed in that Agricultural University and to enhance his / her understanding.

To handle a variety of day to day jobs of counseling and rendering routine assistance to the farmer, there should be "bare foot technicians" who need to be equipped with multiple skills – not only with regard to farm practices, simple and routine veterinary services, routine testing services, and various other rural occupations but also on aspects like agro-processing, marketing, escort services, etc. Such skills need to be developed among the rural youth themselves, preferably targeting school drop-outs, as youth from urban areas or with higher education shy away from working in rural areas. Special effort is needed to promote diploma level education on the lines of engineering education.

Trained human resources are needed in different sectors of agriculture for targeted growth. The sectors are to be serviced by human resources with higher skills than before to ensure technology generation, its transfer to and more importantly its application at the grass root level. Further, agricultural human resources with diverse skills is today required by a wide ranging and fast expanding food processing industry, corporate and unorganized sector. In this context, forecasting of future agricultural human resources requirements assumes considerable significance in identifying the trends and visualizing the emerging technologies and the corresponding needs for the appropriate human resources mix. The assessment of existing human resources, the sectoral growth, and capacity utilization of qualified graduates is indispensable to envisage the future agricultural education needs.

Besides, scientists of ICAR institutes located in the particular state can be drafted for improving the educational outlook of students. Curriculum can be designed for exploiting their expertise as well. In the recent days, the pass out of girl students from school days onwards is on the surge and thus girls getting admitted into agricultural system on the whole are on the rise. Agriculture, as



everyone accepts, is more labour dependent and women labour contributes to the major portion of laborious field works. Available statistics indicate that rural women, mainly farmers, number at least 1.6 billion worldwide represent more than a quarter of the total world population. Nearly half of the world's farmers are women, and women comprise most of the agricultural workforce in developing countries. Women produce on average more than half of all the food that is produced (up to 80% in Africa, 60% in Asia; and 30 to 40 % in Latin America and Western countries).

Rural poverty is deeply rooted in imbalance between what women do and what they have. Statistics show that almost 70% of economically active women in low-income food deficit countries are employed in the agricultural sector and, therefore, play crucial roles in assuring food security. Despite this, rural women battle hunger and poverty on increasingly marginal land with meager resources and their voices are seldom heard among decision makers (FAO, 2007). Considering the larger rural area available in the country and the growing demand for agricultural education among the girl students, "love to serve" model using the girl graduates in the rural area have to be worked out. Incentivizing the studies of rural girl students in agricultural education will be a welcome step.

In Tamil Nadu state alone, there are 328 blocks and if the entire country is considered, it will run to several thousands. At each block or revenue village level, an agricultural graduate's intervention is required for framing the farming activities for that village. In each district, based on the statistical data available, the crop of major choice can be identified and specific interventions for bringing up the productivity of that crop can be attempted through agripreneurs. In this context, establishing All Women Agricultural Research Station (AWARS) at select locations with dedicated team of female scientists to address the core issues faced by the rural population would be a welcome one.

A study taken up at NAARM under NAIP with the survey responses received from all agricultural universities, 4880 employees with degree in agricultural sciences, 2100 alumni, 3500 industrial organizations employing agricultural graduates to forecast future human capital requirements for 2020 in different sectors viz. government, private, academic, financial institutes, non-governmental organizations, self-employment, and others (non-agriculture) in India using system dynamics indicate that substantial gaps between demand and supply of human resources in agricultural and allied sciences exists to the tune of 50 per cent or more. The analysis also showed that in the coming years, the private sector will emerge as a major employer for the graduates of agriculture



and allied sciences. It is also emphasized that three major parameters - demand, supply and skill-set – are important dimensions for developing future scenario of trained agricultural human resources.

The simulation models employed by them indicate that the supply of human resource is projected to be around 16000 in 2020 against a demand of nearly 15000. Though the growth in government sector is assumed to be modest at 2.5 per cent, positive and healthy growth in other sectors drives to reduce demand supply gap with time. In absolute numbers, the gap reduces from 3562 in 2001 to the minimum of 933 in 2018 and then increases to 966 in 2020. This increase in the supply-demand gap towards the tail end of the simulation period reflects the cyclic behaviour of the supply and demand sub-sectors, i.e., with increased demand (reduction of the gap) supply (intake) increases resulting in increased supply demand gap in latter years i.e. during 2018-2020. During this period annual intake would go up by about 14 per cent, whereas the outturn will increase by 20 per cent. Correspondingly, the dropout rate reduces from 26 to 22 percent Moreover, it was observed that non-government sector, private corporate sector in future will emerge as major employer for agricultural human resource. The boom in IT and Computer related fields is driving Companies to accept students with more soft skills. The industry is asking for a mix of 60:40 (technical:soft) skills as compare to the current 80:20 curriculum.

In the book "India 2040: Transforming Indian Agriculture" edited by Marco Ferroni, Syngenta Foundation New Delhi, it has been indicated that to achieve dynamic economic growth, vibrant agriculture growth is needed atleast for meeting the rising demand for food, feed and fiber for a steadily increasing population from the shrinking base of land and water. It has been indicated in that book that growth during the 11th Five-Year Plan was 3.3% per year with increased investments and bumper harvests resulting in full public granaries. However judged by input/output relationships, efficiency is almost universally low. Yields per unit of land and labor are poor, water and nutrient use efficiency is low, and this needs a dramatic change.

India is not having dearth of man power but it is dearth of powerful man. Enhancing the skills of agricultural graduates to address the field problems in multi various perspectives will definitely drive the Indian agriculture in the right path and achieving four per cent growth rate in agriculture will be a near possible one. Improved skills of the teachers, inclusive curriculum including the foreseeing capabilities of students, enhanced learning atmosphere will definitely pave the way for Indian agriculture to surge ahead.



A NOTE ON: MAINSTREAMING AGRICULTURAL EDUCATION FOR VOCATIONAL EDUCATION

Prof. Surendranath Pasupalak

Vice Chancellor

Orissa University of Agriculture and Technology

Generation of skilled human resources is instrumental in developing new technologies, their assessment, refinement as well as dissemination to the farming community and thus plays key role in transforming Indian Agriculture from traditional to modern. Lack of skilled human resources creates a big gap between lab to land. The para- professionals trained in various vocational courses especially in utilitarian mode can bridge the gap through customized services at the farmers' door step.

Vocational Training - Scope and Aspects

- Rural youths unable to pursue higher education, school and college dropouts, women in agriculture who have no facilities of higher education can easily be imparted with skills and oriented towards agriculture vocation with preference to their traditional occupations.
- Universities are concentrating mainly on formal education while there is also need for non-formal education especially in respect of knowledge and technological empowerment of vast section of work force residing in rural areas.
- Neglect in developing middle level skilled manpower appears to be major lacuna for ensuring livelihood security and a significant bottleneck for agricultural development.
- This can be addressed through Vocational Institutions/ Agro-polytechnic Centers, long duration skill oriented training programme, distance learning process etc. with field -based contact classes for skill input and e-learning system through Agricultural Universities.
- A basket full of vocational educations *viz.* Crop Production, Horticulture, Medicinal and Aromatic Plants, Plant Protection, Agricultural Chemicals, Dairy, Poultry, Fishery, Swine, Sheep and Goat Husbandry, Sericulture, Apiculture, Mushroom, Plantation Crops and their Management, Seed Production Technology, Repair and Maintenance of Power Driven Farm Machinery, Veterinary Pharmacist-cum-Artificial Insemination, Agro Based



Food Industry (Crop/ Animal/ Feed based), Post-Harvest Technology, Soil Conservation etc. can be imparted to the trainees for harnessing the benefit in agricultural development of the nation.

- This will expand the opportunities for off-farm employment and decrease dependence of larger segment of the population on agriculture resources for livelihood.
- The absence of well-structured vocational programme lead to communication gap in not only effective transfer of technology from lab to land, but also becoming partner in agriculture transformation.
- Vocational training on a large scale in various fields can significantly bridge this gap.

In this context, the Agricultural Universities equipped with qualified professionals and adequate infrastructure needs to formulate vocational courses and develop para-professionals through mainstreaming vocational education so as to serve the farming community of the nation.



Technical Session I

SUBTHEME: Mainstreaming Agricultural Education for Vocational Education

RECOMMENDATIONS

- To popularize millet cultivation for nutritional security and technological development for mechanization in major horticultural crops
- To offer vocational training using Agri-polytechnic courses in the disciplines of crop production, animal husbandry, farm machinery and food industry
- Share of Indian publication per researcher is above World average by 81.1% and 83.7% for Veterinary and Agricultural & Biological Sciences respectively, while the share of impact of the same is below the World average by 87.1% and 84.4% for Veterinary and Agricultural & Biological Sciences respectively. India's share for the top 1% cited papers of the world has grown by 20.8% and for the top 5% cited papers has grown by 15.4%. Suggested to sensitize our scientists to prepare quality papers instead of quantitative increase.



Technical Session II

**SUBTHEME: INTEGRATION OF SKILL DEVELOPMENT
AND POLYTECHNIC PROGRAMMES IN VOCATIONAL
EDUCATION**



Technical Session II

SYSTEMS INTEGRATION OF SKILL-BUILDING
AND POLYTECHNIC PROGRAMS IN VOCATIONAL
EDUCATION

INTEGRATION OF SKILL DEVELOPMENT AND POLYTECHNIC PROGRAMMES IN VETERINARY AND ANIMAL SCIENCES SECTORS

Dr. S. Thilagar

Vice-Chancellor

Tamil Nadu Veterinary and Animal Sciences University, Chennai – 600 051

Livestock production and agriculture are intrinsically linked, each being dependent on the other, and both crucial for overall food security. With the threat to crop based agrarian economy arising from issues like fragmentation of land holding, vagaries of monsoon and poor pricing and marketing issues, allied fields of agriculture like livestock, poultry and fisheries emerge as an alternative and provide year round sustained income. India has vast resource of livestock and poultry, which play a vital role in improving the socio-economic conditions of rural masses. There are about 304.8 million bovines, 71.6 million sheep, 140.5 million goats, 11.1 million pigs and 648.8 million poultry as per 18th Livestock Census in the country. Except the pig population, the growth rates of other categories of livestock are in the positive side with poultry sector topping with 32.68%. The growth rate of bovines, sheep and goat are 7.52%, 16.41% and 13.01% respectively. The *per capita* availability of milk and eggs is 296 grams and 57 respectively. According to estimates of the Central Statistics Office (CSO), the value of output from livestock sector at current prices was about Rs. 5,37,535 crores during 2012-13 which is about 25.63% of the value of output from total agricultural, fishing, and forestry sector at current price and 26.02% at constant prices (2004-05). Livestock sector, which recorded a growth in value of output about 4.8% per annum in Eleventh Five Year Plan has excellent potential for higher growth in Twelfth Five Year Plan. The major challenges in promoting allied activities as an alternative to agriculture are lack of skills and quality services to farmers besides diseases, shortage of feed and fodder, breed improvement etc.

The most important issue in promoting allied activities of agriculture is lack of skills at different levels. Skill development also significance in the context of nation's advantageous demographic dividend of 20-25 years and metamorphosis of animal husbandry from back yard avocation to industry status. It assumes significance as skill development makes the labour force employable and ensures a 'decent work'. According to 2001 Census, agriculture and allied activities accounts for about 15.7 % of country's GDP and is estimated to employ about 124.7 million people as cultivators and 106.8 million as agricultural labour.



According to NSSO 66th Round Survey (July 2009 – June 2010), total number of workers in farming of animals is 20.5 million and farmers of marginal, small and semi-medium operational holdings (area less than 4 ha) own about 87.7% of the livestock. Hence, there is a huge demand for skilled workers besides inculcating skills to farmers. In this context the National Skill Development Council (NSDC) has established Agricultural Skill Council of India (ASCI) as a Section 25 company to develop skills and to motivate youth to voluntarily join skill development. There is need to strengthen the ASCI and to broaden the scope of ASCI with thrust on livestock sector. At present ASCI is targeting to upgrade skills of about 56.49 Million of cultivators, agricultural labours and direct and indirect labour engaged in organised and unorganized agriculture industry.

India has the second-highest population of the working age (15– 59 years) individuals in the world. The skill set of this population group plays a critical role in the growth of the country. India is developing into a knowledge based economy due to the vast availability of qualified human resources. However, the human resources lack in skills to be globally competitive. Hence, skill development has assumed greater significance. Based on the Census 2011 and NSSO (68th Round) data, it is estimated that 104 million fresh entrants to the workforce require skill training by 2022, and 298 million of the existing workforce will require additional skill training over the same time period. Further based on data from same source it is estimated that only 4.69% of India's total workforce has undergone formal skill training, compared with 52% in the USA, 68% in the UK, 75% in Germany, 80% in Japan and 96% in South Korea.

The National Skill Development Council (NSDC) has identified 21 high growth sectors, which could provide employability, 10 high growth sectors for manufacturing besides 14 sector skill councils. NSDC's target for producing skilled workers in sectors related to veterinary and animal sciences are Leather (7.3 million), Food Processing (10.06 million), Agriculture (5.53 million), Poultry and dairy (2.24 million), Rural services (3.87 million). In the process of skill development, the Ministry of Agriculture, Government of India has been set a target of 20 million people with skills by providing training in agriculture extension (21 training centers), training in the use of agricultural implements and machinery, soil conservation training center. Further, the Ministry of Food Processing and Technology has been given a target to produce 2million skilled persons through training courses on research institutes and food processing and training centers (FPTCs).



To make the process of skill development efficient FICCI has created a framework for creation of efficient delivery model, which is provided below;

Availability

Focuses on the needs of both learners and the labor market in order to make these skills available by forging partnerships between public administrators, suppliers of educational services, industry and civil society

Accessibility

Directly addresses learners' demand coming from varied geographies and socio-economic backgrounds such as education levels, income levels, industrial growth, etc.

Adaptability

Focuses on learners' priorities of vertical mobility for those pursuing skills, and will enable learners to shift from skill-based training to academics and vice versa

Meets learners' requirements for well-established competency standards, affiliation and accreditation

Acceptability

Facilitates learners' priorities in terms of quality of infrastructure (ICT and physical infrastructure), pedagogy and skill delivery methods

Focuses on learners' needs for developing an advanced curriculum framework based on best industry practices

The major objectives of the National Skill Development policy (2009) is to increase the access of education and training by establishing industrial training institutes (ITIs), vocational schools, technical schools, polytechnics and professional colleges to facilitate continuous professional development programmes, internships / externships, sector-specific skill development, e-learning, training for self-employment and other forms of training. The focus of these programmes are also now increasing learner centric. The Government has also started the Skill India programme in this regard. The main goal of this programme is to create opportunities, space and scope for the development of the talents of the Indian youth and to develop more of those sectors which have already been put under skill development for the last so many years and also to identify new sectors for skill development. This programme aims at providing



training and skill development to 500 million youth of our country by 2020, covering each and every village. The emphasis is to skill the youths in such a way so that they get employment and also improve entrepreneurship.

As per the FICCI's Knowledge paper on skill development in India – Learner First (2012), "The accelerated economic growth of India has increased its demand for skilled manpower, which has highlighted the shortage of skilled manpower in the country". The same paper also specifies that India is among the top countries in which 48% employers are facing difficulty in filling up the jobs, which is above the global standard of 34% in 2012. The reasons attributed were lack of available applicants, shortage of hard skills and shortage of suitable employability, including soft skills. Potential for skill development in India is huge. With a growth projected growth rate of 8% in the next 10 years, around 500 million Indians require some sort of skill training. The Government of India has identified 20 high growth sectors, which could provide employability and primarily skill development need to be focussed in these areas.

Tamil Nadu is one of the leading States in terms of demographic dividend with approximately 66% of the population lying between the age group of 15-59 years. This state has excellent education infrastructure and is the largest producer of skilled workforce in India. Skills development has also been identified as a priority activity under the Vision 2023 framework with 65million USD investments in Agriculture practices. Further, the Government of Tamil Nadu has started the Tamil Nadu Skill Development Corporation, which is a non-profit organization registered under Section 25 of Indian Companies Act 1956. It has been formed with an objective of imparting employability skills to youth for gainful employment. It has planned to provide skill development training programmes at an estimated cost of Rs.5701.56 lakhs to 1,04,723 youth.

The Tamil Nadu Veterinary and Animal Sciences University has taken a lead in the sector of skill development. It is the first Veterinary University in the country to start a separate Directorate of Distance Education. This Directorate caters to target groups at all levels. This Directorate is offering 15 skill development courses, 15 self-employment courses and 22 certificate courses for farm workers and unemployed youth. Enrolment for these courses is encouraging as a total 1653 candidates have registered for these courses in the past two years. The University has obtained a grant of Rs. 102 Lakhs to establish a Centre for Polytechnic courses in Animal Sciences at Pudukottai. The major objective of this centre was to offer skill development courses in different farming and non-farming sectors in livestock and poultry to facilitate income generation.



Twelve different polytechnic courses offered under this project are clean milk production and value addition of milk, reproductive management in dairy cattle, artificial insemination, fodder production, feed and feed formulation, value addition of meat, scientific goat farming, scientific pig farming, hatchery management, breeder flock management in turkey, vaccinator and commercial emu farming. The skill development courses offered on rotational basis with duration of three months has so far benefited about 561 stakeholders. Further, 12 training manuals, one brochure in Tamil have been published and distributed to the participants.

Further, skill development and capacity building should not be restricted to unemployed youth, prospective entrepreneurs, farmers and farm labourers. In veterinary and animal sciences, skills of practicing veterinarians also need to be upgraded regularly so that quality veterinary service is provided. In this context continuing veterinary education (CVE) programmes assume significance. These programmes should be made mandatory and the government should if possible link the promotion policy with this. Every practicing veterinarian should be made to attend at least one CVE programme. To facilitate this, CVE portals need to be developed.

In conclusion, the higher education institutions need to realise the potential of agriculture sector, its employability, Government's initiatives in skill development. They need to change their status from merely being a seat of higher education. They have to ensure that skills at all levels are enriched thereby the sectors grows in leaps and bounds.



INTEGRATION OF SKILL DEVELOPMENT AND POLYTECHNIC PROGRAMME IN FISHERIES SECTOR

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Fisheries sector in National context

Fishery is one of the important allied sectors of agriculture in India which has been growing consistently from the first five-year plan onwards. Starting from a purely traditional activity in early post-independent years, fisheries and aquaculture have now transformed into a technology-based fast growing food production sector. The sector contributes towards creation of rural livelihoods, providing food and nutritional security and earning hard currency through export of fish and fish products.

Constituting about 5.8% of the global fish production, India today is the second largest fish producing nation in the world. India is also a major producer of fish through aquaculture and ranks second in the world after China. The total fish production during 2014-15 was over 10.0 million tonnes with a contribution of 5.6 million tonnes from aquaculture and 4.4 million tonnes from capture fisheries. The incredible 14-fold growth in Indian aquaculture during last three decades and half, i.e. 0.37 million tonnes in 1980 to over 5.60 million tonnes at present, has been largely contributing to keep the growth pace of fish production in the country. Fish products also form a significant commodity for overseas trade and seafood export of the country have increased fivefold in the last 15 years to touch 6.5 billion dollars (> Rs.35,000 crores) placing India fourth among the top seafood exports.

The national average of fish yield rate for freshwater aquaculture is still hovering around 2-3 ton / ha / year. On the other hand the results obtained by ICAR research institutes and several best performing farmers around the country indicated that the fish yield can be easily enhanced to 8-10 ton/ha/year. These data indicate that there exists a big gap (extension gap) between the actual and potential yield rates and therefore there is a vast potential for further improvement. The area under culture is also a small part (about 40%) of the existing resources (0.95 million ha out of 2.41 million ha). Similarly only 15% of the available area (1.30 million ha) for brackish water aquaculture is taken up for utilization (4MT/year) and there is considerable scope for enhancing its productivity. India should be able to reach farmed shrimp production of 8 mmt



by 2020, so there is a big opportunity to establish aquaculture as a leading agro – Industry sector in India **generating employment nearly 12 million people**. In case of inland fisheries, reservoirs and floodplain wetlands offer greater scope for increasing fish production through culture – based and enhanced fisheries, against the estimated fish yield at the rate of 250 kg (350 kg) / ha/ year from reservoirs and 1500 kg (350 kg) /ha/year from floodplains / wetlands. There has been sharp increase in fish yield of certain reservoirs adopted under the NFDB reservoir fisheries development programme where the average fish yield has been recorded to the level of 174 kg/ha/year for small, 94 kg /ha/year for medium and 33kg/ha/year from large reservoirs with an average fish yield of 110 kg ha/ year. Our country has vast flood plains in the form of oxbow lakes (Manus, Beels, Chauras and Jheels) especially in Assam, Bihar and West Bengal for flood plains/wet lands, the fish yield in certain West Bengal wet lands has gone up to over 3 ton/ha/year. Irrigation canals, though bearing adequate potential for fish production are yet to be tapped. Compared to agriculture and other allied sector, like animal husbandry, fisheries sector is relatively much younger and hence the need for human resource development is much higher to harness its potential. Fisheries sector contributes about 1.07 percent to the overall GDP and 5.15% of the Agricultural GDP. Globally the share of aquaculture is projected to rise to 62% of the total fish production by 2030.

The fisheries and aquaculture sector is expected to produce 16.0 million tonnes of fish by 2030 and shoulder the challenges of food and nutritional security of increased population of the country. The Fisheries sector over the years has transformed from subsistence-based artisanal activities to modern livelihood activities with the application of science and modern technologies in the field of capture fishing and culture fisheries. It is developing as a major industry with diversifications viz., exploring deep sea resources, eco-friendly aquaculture practices for culture of finfish and shell fish, ornamental fish culture, eco-tourism, fish processing parks, mid sea fish processing units, etc.

Tamil Nadu State scenario

In this national development, the state of Tamil Nadu has major contribution by way of direct and indirect employment for more than 11 lakh fishers, providing food security to a considerable portion of population and earning substantial revenue, especially from foreign exchange. Tamil Nadu State, with its second longest coastline in the country covering 1,076 km in 13 coastal districts has immense potential for growth and development of fisheries. Tamil Nadu ranks 5th in total fish production of the country and the total fish production of the



State during 2014-15 is 6.97 lakh tons. (from marine resources -4.57 lakh tons and freshwater and brackish water resources -2.40 lakh tons). Tamil Nadu is one among the leading exporter of sea food with the export of marine products of 93,447 MT and earned a foreign exchange of Rs.5,308.17 crore during 2014-15. The fisheries sector has contributed 0.7 percent of the total Gross State Domestic Product (GSDP) of the State.

Technical base of Fisheries sector

In agriculture, major developments started happening only after the adoption of advanced technologies and participation of technical manpower in solving the field level issues. The same trend applies to all other allied fields of agriculture. Role of State Agricultural Universities (SAUs) in developing human resources for Indian agriculture sector is undeniable and unparalleled. In fisheries sector also the SAUs play a significant role. Along with 2 Central Institutes, there are 21 Universities (20 SAUs + 1 CU) offer degree programme in fisheries and there are many conventional universities too take part in the research and higher education programmes through PG research and PhD programmes. All these higher education institutes focus on the development of manpower at senior level or administrative positions, leaving the bottom line to be manned by non-technical or semi qualified personnel. This often distracts the industry from adopting modern technologies and advanced techniques. Therefore, the need for the grass root level technical manpower is felt as an emerging issue both in the fish production and fish processing industries.

Need of the Skill development programmes

The term 'skill' refers to an acquired and practiced ability or to a qualification needed to perform a job or certain task competently, and one who possesses this ability can be considered as a skilled worker. Skill development is a necessary priority for meeting at least two challenges, viz., economic challenges and social challenges. Skills can contribute to economic growth and the international competitiveness of various sectors. Also, poverty reduction, employment generation and creation of social capital are achieved.

In general, the mindset of any graduate is engaging in office jobs instead of field activities. Though fisheries and aquaculture is a highly practical field, most of the fisheries graduates prefer employment in laboratory oriented research and development. Sometimes fisheries graduates opt to change to other professions that involve less or no field work.



Short term training programmes, certificate skilled programmes are offered by different fisheries colleges, KVK and Central fisheries institutes. Andhra Pradesh is the only one state in this country to run two year Diploma course in fisheries after standard X. The diploma courses cater to the needs of developing suitable man power for para fisheries staff in fish and shrimp farms, hatcheries, feed companies, processing industries, self-employment etc. Unlike graduates whose aspiration is working in the city or abroad, the Diploma holders can work in remote villages. The expectation of monthly emoluments is also less than graduates even the small industries can employ the Diploma holders and on the other hand, big companies employ more number of diploma holders.

Skill Development in Fisheries Sector

Fisheries production in the country is in an increasing order registering around 6% growth annually. Considering the overall production in the world fisheries which is growing at a pace of around 9% annually, the scope for Indian fisheries is remaining very promising due to the ever expanding demand and production area. Presently Indian fisheries sector has a base with technical manpower at its higher level. Many of the programmes that are being offered in many Universities are higher education programmes targeting the post-matric qualified candidates which make them further qualified with degrees and post-graduate degrees.

The higher education and research in fisheries help the incumbents to get knowledge and elaborated understanding of the subject whereas the skill development in particular helps the incumbent to have primary information and an understanding of the principles of the subject that can help him to execute the directions. Thus skill development assumes great importance in the field level operation of the technical aspects. Therefore, it can be said that with a broad base of the semi-skilled technical workforce, the development can be stable and sustainable.



Details of the man power requirement in various fields of Fisheries are depicted in the following table:

Skilled man power requirement

SL.NO.	SECTOR	DETAILS OF THE JOB REQUIREMENTS
1	Shrimp culture (Farming sector)	Total no of jobs available – 20,000 For every 5 % increase – 1000 / year in mid level technician category 2000 /year Entry level technicians / supervisors If the estimated annual increase is 5% , by 2020 the total job requirement for the industry would be 12000 in mid level technician category 18000 in entry level (technicians / supervisors)
2	Shrimp hatchery	No of hatcheries in operation at present – 250 No of lab assistants employed – 1/ hatchery No of mid level technicians employed – 5/ hatchery If this requirement increases by 5% annually, by 2020 the requirement would be (for 263 hatcheries) No of lab technicians – 263 No of hatchery technicians – 1315
3	Feed marketing	Present requirement Feed sales and marketing personnel - 1400 Managers - 140 If the estimated annual increase is 5%, Total no of jobs that would be available by 2020 Feed sales and marketing personnel - 1680 Managers - 168
4	Freshwater and marine finfish culture	Total No of jobs currently available Freshwater - 900 Marine - 450 If the estimated annual increase is 5%, Total no of jobs that would be available by 2020 Freshwater - 945 Marine - 473
5	Ornamental fish culture	Total number of person actively involved this sector of Tamil Nadu = 6500 This sector is increasing at 8% per annum Skilled person requirement = 150 to 200/ annum Total number of jobs that would be available by 2020 – 1000 nos.



6	Fishing technology and Engineering	Total no.of jobs currently available in Tamil Nadu -46,000 persons skill training requirement =1000 person / annum
7	Seafood processing and exports	There are about 15 processing plants are fully functional in Tamil Nadu Total jobs currently available in worker stage -1500 Nos. Skilled personals - 450 Nos. Technically qualified - 30 Nos. Preparing workers at entry level -1000 nos. /annum

Considering the above requirement following programmes can be planned in fisheries sector for the development of base line manpower under Polytechnic College

Courses to be offered in the Fisheries sector

SL.NO	TITLE OF THE SKILL DEVELOPMENT PROGRAMME	TYPE	DURATION
1	Shrimp farming Management	Diploma	1 year
2	Shrimp Hatchery Management	Diploma	1 year
3	Fish hatchery management and Seed production	Diploma	1 year
4	Aquaculture of fish	Diploma	1 year
1	Shrimp farm Engineering	Certificate	6 months
2	Fish broodstock management and breeding	Certificate	1 year
3	Soil and water quality management	Certificate	6 months
4	Live feed culture – Feed quality assessment	Certificate	3 months
5	Fish seed nursery rearing and seed quality assessment techniques	Certificate	3 months
6	Fish health management	Certificate	3 months
7	Cage culture	Certificate	6 months
8	Harvesting and marketing of fishes	Certificate	3 months
9	Hatchery technician	Certificate	1-2 years
10	Culture technician	Certificate	6 months – 1 year
11	Aquarium technician	Certificate	6 months – 1 year
12	Fabrication technician	Certificate	6 months – 1 year



13	Disease and health management	Certificate	1-2 years
14	Hatchery and culture assistant	Certificate	6 months – 1 year
15	Marketing (Import and Export) management	Certificate	2 years
16	Feed Production	Certificate	One month
17	Quality control in feed production	Certificate	6 months
18	Sales and Marketing	Certificate	6 months
19	Navigation, Engineering and seamanship	Certificate course Advanced certificate course	3 months 6 months
20	Fishing vessel maintenance and onboard processing	Certificate course Advanced certificate course	3 months 6 months
21	Deck hand	Certificate course Advanced certificate course	3 months 6 months
22	General hygiene and sanitation	Certificate course – Entry level	3 months
23	Food safety and documentation	Certificate course – mid level	3 months
24	Seafood pre-processing	Certificate course – mid level	3 months
25	Seafood processing	Certificate course – mid level	3 months
26	Raw material receiving	Certificate course – mid level	3 months
27	Seafood storage	Certificate course – mid level	3 months
28	Seafood procurement	Certificate course – mid level	3 months
29	Seafood QC lab practices	Certificate course – mid level	3 months
30	Fish farming and fishery resources	Certificate course	3-6 months
31	Fisheries Science	Diploma	2 years
32	Fisheries Science	Certificate	6 months – 2 years
33	Fisheries Science	Certificate	6 months

Fund requirement

To start a Polytechnic college with an intake of 400-600 candidates per year under various programmes sum of Rs.35 crores (Building facility including students hostel cost 19.00 crores and establishment equipments and cost of personal Rs.16 crores) for 5 years is required.

With above facilities following objectives could be achieved

- To create skilled manpower for industry requirements at various levels
- To empower underprivileged youth from rural and semi-urban communities, leading to employment and income generating opportunities.
- Empowering men/women from socially and economically backward sections and helping them augment their family income by providing meaningful skills trainings and market access for their goods and produce.
- To meet the second level positions in fisheries department, fisheries colleges. Central fisheries institutes and other needy Government sectors.
- Developing rural enterprise by creating rural entrepreneurs with eco-friendly and sustainable technologies

With the implementation of Polytechnic in Fisheries Sector it is highly possible to increase the aquaculture production and a sustainable growth of allied industry into many folds in the coming year to make in India a strong nation.



INTEGRATION OF SKILL DEVELOPMENT AND POLY-TECHNIC PROGRAMS IN VOCATIONAL EDUCATION FOR AGRICULTURE

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1. Demographic advantage & skill development

- International Labour Organization (ILO) estimates the population of young India (employable age group of 20-24 years) by 2020 will be around 160 M while that of China it will be around 94 M only.
- All developed countries are estimated to have labour deficits including US (estimated with 17 M short of its requirement)
- Demographic advantage can turn India into the worlds' largest work engine - but only through appropriate skill development

2. Skilled manpower in Agriculture - A pre-requisite for development

Present scenario

- Agriculture is still the largest enterprise in India -42% of our population is still dependent on it.
- "Disguised" and "Under employment" is still rampant, triggering agricultural alienation & urban migration

Emerging changes

- Paradigm shift from subsistence to commercial agriculture where return on investment through technology use that require skilled labour holds the key
- Emergence of an elite class of "Facilitator Farmers" (shift from practicing farmers) arising from new social trends that favour "back to nature" life styles that bring NRI returnees, corporate/ IT drop outs and celebrities into farming.
- Rising investments in Corporate Farming and Agri-enterprises by MNCs in third world countries
- Trend towards alternative-labour-intensive forms of agriculture like Organic Farming



Therefore skilled labour in agriculture is a pre-requisite for improving income and employment that can ensure poverty alleviation and development at large.

3. Mismatch of current competencies and emerging requirements

- Present academic and HRD programmes in agriculture are mostly “concept and knowledge based” and is widely acknowledged for their TOT interventions as technology facilitators.
- This is because most under graduate programmes (certificate & VHSC courses, diploma programs, degree programs in agriculture & allied sectors) are aimed at producing experts, consultants and technology managers for wage employment whereas advanced graduate programs facilitates competencies in research and teaching in the sector.
- The void of technical expertise needed for practicing skills has long remained unaddressed at the professional level

4. Bridging the gap

For developing skilled functionaries in agriculture, measures that could be attempted include

1. Establishment of Polytechnics in agriculture
2. Integrating vocational schools and strengthening the skill development capacity
3. Evolving a Labour Market Information system

5. Polytechnics in agriculture

- The increasing labour shortage in Kerala has focused farmers to consider alternate approaches to farming. But one of the major limiting factors is the shortage of manpower at the grass roots level - men and women who are trained to work as technicians in the field.
- Hi-Tech agriculture, protected cultivation, processing and value addition etc requires technicians who can actually be involved in such specialized agricultural operations.
- Intervention is needed to break the barriers between vocational training and conventional degree programmes, while integrating formal education with job oriented skills from the secondary school.



Some of the concerns of Agriculture Polytechnic Education are

1. Non-availability of courses in new and emerging areas.
2. Inadequate infrastructure facilities and obsolete equipment.
3. System unable to attract teachers, Teachers Training and Retention.
4. Inadequate financial resources.
5. Inadequate or non-existence of state policies for training and retraining of faculty and staff.
6. Lack of flexibility and autonomy to the institutions.
7. Inadequate industry institute participation.
8. Lack of Research and Development in technician education.
9. Antiquated Curricula.
10. Inadequate linkages with industries
11. Absence of a National Competency Testing and Accreditation system.
12. Lack of equivalence for employment purposes.
13. Lack of vertical mobility.
14. Inflexible curriculum, Flexibility of Course design, modularity.
15. Lack of convergence between various agencies.
16. Lack of overall social recognition.
17. Employability and demand and supply matching.
18. Informal sector's requirement.
19. Multiple skills.
20. Open and distance learning.
21. Linkage to local demand.
22. Emerging sectors.
23. Horizontal and Vertical Mobility
24. Equity (Girls, rural population, SC,ST, Minority and Disabled)
25. State Governments Role

6. Vocational schools

- Strengthening of existing Vocational Schools
- Establishing new Vocational schools



- Provision of multiple-entry, multiple exit and flexibility in delivery and joint-responsibility of academic institutes and industry/employer for making a person employable.

7. Labour Market Information system

- Collection, evaluation and dissemination of labor market information to both the labour supply side and the labour demand side.

8. Skill proficiencies to be addressed

- i. Soil & nutrient management
- ii. Water management and irrigation techniques
- iii. Seeds & planting material sourcing, & quality certification procedures
- iv. Land development & agronomic practices
- v. Nursery management & landscaping
- vi. Plant health management
- vii. Processing & value addition
- viii. Development & maintenance of structures in agriculture
- ix. Operation and maintenance of machineries and tools
- x. Marketing and trade processes and procedures
- xii. Skills that equip them for self employment or as agro-service centre operators in SHGs who can be hired in agriculture (eg. Green army)

9. The Urgency (conclusion)

If we get it right by educating and training them, we can really transform not just our economy and society, but the world. If we get it wrong, the demographic dividend becomes a disaster as is evident from the growing social distress. Thus the skill development in agriculture is not just a socio-economic issue of development, but also an issue of gross national happiness.



Technical Session II

SUBTHEME: Integration of Skill Development and Polytechnic programmes in Vocational Education

RECOMMENDATIONS

- Support of initiatives of Union and State Government for inculcation of right skills at all levels.
- Polytechnic for fisheries exists already in Andhra Pradesh and present model is applicable to all maritime states. Course content may be developed uniformly under the supervision of ICAR. Eligibility criteria shall be fixed as 10th pass / 12th pass. Course fee/ financial support to candidates has to be provided.





Technical Session III

**SUBTHEME: Contribution of Livestock, Poultry and Fishery
Sectors on Employment Generation**



ANIMAL PRODUCTS, BYPRODUCTS AND POSTHARVEST TECHNOLOGY: GROWTH, IMPACT AND POTENTIAL

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India is bestowed with vast livestock wealth and the output from this sector is growing at the rate of about 5-6% per annum. Although the share of agricultural sector in GDP is declining but the contribution of livestock including poultry and fish to agricultural GDP is increasing substantially. The livestock sector alone contributes 25.6% of the total value of output in agriculture, fishing and forestry sector. According to estimates of the Central Statistics Office (CSO), the value of output from livestock sector at current prices was about 6,23,861 crores during 2013-14. The value of output from milk and meat groups was 4,07,396 and 1,32,360 crores whereas from eggs and wool group it was 22,423 and 569 crores, respectively.

Livestock wealth in India: India has the largest population of milch animals in the world, with 108.7 million buffaloes, 190.9 million cattle, 135.2 million goats and 65 million sheep. However, cattle population has decreased by 4.10% from 199 million in 2007 to 190.9 million 2012. Similarly, the population of male cattle (either exotic or indigenous) and indigenous female cattle has also decreased, however population of exotic female cattle has increased during 2007-2012. Registering a growth of 3.19%, the buffalo population has increased from 105.3 million to 108.7 million, with major growth in female buffalo population that has increased by 7.99% between 2007 and 2012. Significant difference has been observed in the population of work (draught) and milch buffalo as the population of former decreased from 5.57 million to 4.09 million, while the population of milch buffalo increased from 48.64 to 51.05 million during 2007 to 2012.

The number of poultry, ovine and pigs per 100 households (in rural areas) during 2012-13 were reported as 163.1, 63.4 and 3.7, respectively (NSS report No.572). The percentage of households reporting animal farming was found to be the highest in the marginal category of operational holdings, registering more than 73% of household operational holdings during July, 2012 to June, 2013. The estimated land area used for livestock farming (i.e. land used for only farming of animal/fishery and both crop production and farming of animal /fishery) is less than 5 % of the total area under different types of land uses. Among all the land used for animal farming, the major use of area of land was made for dairy



(53.8% during July-Dec.,2012 and 69.7 percent during Jan., 2013 - Jun'13). The lowest share was for piggery, which was less than one percent of the total area under animal farming.

Animal products scenario: Occupying number one status with 18.5% share in the world milk production, India in the last fiscal year produced 146.3 million tons of milk, out of which more than 51% was from buffalo. Buffalo meat and poultry sectors have also shown phenomenal growth during last two decades, nevertheless, India's meat production is hardly 2% (6.24 million tons) of the global meat production (308 million tons). Moreover, average productivity of livestock is much lower in India as compared to world average. Per capita availability of different livestock products in India is 322g of milk (per day), less than 5 kg of meat (per year), and around 65 eggs (per year). Thus, there is an urgent need to improve per capita availability of livestock products by improving the productivity.

An important and significant contribution to national economy comes in the form animal products export, which was to the tune of Rs. 33128.30 crores in 2014-15, including the buffalo meat (Rs. 29,282.60 crores), sheep/ goat meat (Rs. 828.11 crores), poultry products (Rs. 651.21 crores), dairy products (Rs. 1,205.38 crores), animal casing (Rs. 19.32 crores), processed meat (Rs. 14.21 crores), other meat (Rs. 2.67 crores), and natural honey (Rs. 535.07 Crores) (APEDA, 2015). During the same time, leather items worth Rs. 39000 crores were exported (CLE, 2015). A surge in the demand for Indian buffalo meat in international market witnessed during last one decade has sparked a sudden increase in its export. In the year 2014-15, Indian buffalo meat shipment worth \$4,781.18 million has surpassed the earnings through basmati rice (\$4,518.25 million), the top agricultural commodity exported from India till now. Indian buffalo meat export, which was only Rs. 5,830.70 crores in 2009-2010 has touched an all-time high of Rs. 29,282.60 crores during 2014-15 (APEDA, 2015). The main markets for Indian buffalo meat and other animal products are Vietnam, Malaysia, Thailand, Saudi Arabia, Egypt, and UAE.

Although India has acquired number one status in the world milk production, yet the meat production, which vibes well with dairy, is very low. The major key issues of concern in the meat sector of India are hygiene, welfare, processing status and inefficient utilization of byproducts. On the other hand, Indian poultry industry has witness remarkable growth from backyard to organized poultry farming with steady production of 3.04 million tons of poultry meat, 78.48 billion eggs per year and employment generation for about 3 million



people. The organized sector of poultry industry is contributing nearly 70% of the total output while the rest 30% comes from unorganized sector. Considering the growth of this industry, the future prospects for the industry are bright. The fast changing food habits, rising income of the middle class Indian, presence of private players, increasing market demand of the Indian poultry produce are some of the major factors that contributed to the growth of poultry industry. However, the biggest challenges to this industry are increasing feeding cost, frequent disease outbreaks, low availability of adequate infrastructural facilities, and inadequate linkages between R&D labs; which are forcing the Indian meat and poultry industry to stand at a lower position in respect to the global markets.

Despite the growth in buffalo meat production and export, the buffalo production has shown a continuous upward trend during the last five years. During 2007-2012, not only an increase in buffalo population from 105.34 to 108.70 million was noticed but the population of breedable female buffaloes as well as male and female calves also increased. The absolute increase in buffalo population from the year 1951 to 2012 has been from 43.4 million to 108 million. Similarly, the male calves below one year of age have also increased from 2.9 million to 10.8 million, while the female calves increased from 4.2 million to 20.2 million. However, the trend during 2007-2012 was different as the population of male buffaloes decreased from 19.59 to 16.10 million, whereas the female buffaloes increased from 85.74 to 92.60 million. Efficient buffalo production and utilization is important for rural prosperity, livelihood and sustainable buffalo keeping.

The ever-increasing differences in the price of male and female calves clearly indicate the neglect of male calves by dairy farmers. Male calf, therefore, is unfortunately not cared for and resultantly does not survive. It is expected that over a period a new niche market, with a premium price realization for buffalo calf meat would emerge, and in that case, even intensive male calf rearing could be self-sustaining. There is an urgent need to fully realize the potential of male buffalo calves for meat purpose. The male buffalo calves have potential to grow up to 300 to 350 kg within 2 years of age and can be sold for Rs. 20000- 25000 each. The total cost of feeding and rearing up to 300 kg body weight will not be more than Rs. 10000 to 12000. Therefore, this could be an important tool for ushering rural prosperity in India by increasing export earnings through buffalo meat and leather, and generating employment for rural youth. Accordingly, the Government of India is promoting the salvage of male buffalo calves under National Livestock Mission and Entrepreneurship Development and Employment Generation Scheme. There is provision of subsidy with the



ceiling of Rs 6250 per calf for Mini unit, up to Rs 6000 per calf for commercial unit and up to Rs 3125 per calf for Industrial unit of male calf rearing. Scientific rearing of male buffalo calves with reduced mortality is essential requirement for improving buffalo productivity and sustainable buffalo production. The complementary approach of major stakeholders such as dairy, meat, leather, feed and associated sectors needs emphasis.

Animal products such as milk, meat and eggs play an important role in the socio-economic upliftment of rural and urban masses in India as they are rich source of high quality proteins. In order to effectively overcome malnutrition and under-nourishment amongst Indians, 20g of animal protein/person/day or 7.3 kg/year should be provided. This can be achieved by supplying 33 kg lean meat or 45 kg fish or 60 kg eggs or 230 kg milk for annual consumption. These sources are usually combined in the daily food intake; however, in the regions where not all of these are readily available, intake of protein from other sources needs to be increased.

Animal byproducts such as edible and inedible offals, hides and skins, blood, fat, tallow etc. constitute about 30% of the live-weight of hogs and about 44% of the live-weight of cattle. Byproducts from animal slaughter provide raw materials used in pharmaceutical, cosmetic, household, and industrial products. Animal byproducts are also a major contributor to the growth and expansion of the pet food industry. Efficient utilization of by-products has a direct impact on the economy and environmental pollution levels of the country. Non-utilization or under-utilization of by-products not only leads to loss of potential revenues but also to the added and increasing cost of disposal of these products. Animal byproducts contribute to the bottom line livestock industry, in general and meat industry, in particular. In India, cow dung and urine utilization is gaining importance. However, the slaughter house waste management system is very poor and several measures are being taken for the effective abattoir waste management.

Livestock and poultry farming systems have tremendous potential for expansion and employment generation. Animal Husbandry and Dairying may be regarded as a source to create the employment in rural areas all-round the year. Indian Agriculture is mainly dependent on monsoon, and hence, the agrarian management faces challenging of providing employment during such periods. On an average, the agriculture sector may provide 200 days employment to the rural persons. This means that agriculture workers have to find out alternate sources of employment for income during rest of the year. The dairy farming,



sheep and goat rearing, poultry production, pig farming and rabbit rearing are the alternate sources of mixed farming. Therefore, it is possible to generate the employment for the farmers as well as landless laborers who can do these jobs for others or themselves, or to employ young and the old family persons in these activities as a side business. Many of the operations in Animal Husbandry and Poultry Farming can be done by the rural women. Poultry farming can also be taken as a part-time occupation, especially by women, landless, small and marginal farmers. According to the ICAR Vision- 2025 document, an increase in per capita availability of one egg will generate 50,000 more jobs. Similar increase in employment generation is anticipated due to acceleration in broiler production, marketing of eggs and meat, processing, etc. Livestock rearing for milk and meat also have almost similar potentials. Youth, in general, and educated unemployed youth in particular, can take up easily these activities as their profession, and can earn a handsome income within a short period of time. It is estimated that this sector has the potential to provide on an average 35 million human years/annum employment generation.

ISSUES TO BE ADDRESSED

Livestock sector is an integrated component of agricultural activities in the country. Due to rising demand for animal products and changing food preferences of the next generation consumers, the Indian livestock sector has to improve its performance. Therefore, there is urgent need of increasing livestock productivity and production in a sustainable manner, while protecting the environment, preserving animal bio-diversity, ensuring bio-security and farmers' livelihood.

Livestock Production: Indian cattle and buffalo milch breeds have inherent capability of heat tolerance, resistance to diseases and ability to thrive under extreme nutritional and environmental stress. However, the average yield of milk and meat in our animals is 20-60% lower than the global average. Further, their production potential is not realized fully because of constraints related to feeding, breeding, health and management (Taneja, 2012). This is the high time to focus on conservation and genetic improvement of important indigenous breeds of livestock and poultry in the country by using modern biotechnological tools including artificial insemination (AI), in order to gradually replace our huge non-descript population to augment livestock productivity.

Increasing Demand for Feed and Fodder: Adequate availability of feed and fodder to livestock is vital for increasing the productivity and also for sustaining



the initiatives taken for genetic improvement. Optimum and efficient utilization of feed and fodder resources holds a key for successful commercial livestock production. The deficit of dry fodder, concentrates and green fodder currently is 10, 33 and 35%, respectively. (Taneja, 2012). A large gap exists between demand and supply of feed and fodder in the country as the deficiency of feed and fodder accounts for half of the total loss, followed by the problems of breeding and reproduction (21%) and diseases (18%) (Taneja, 2012). Moreover, this gap is increasing day-by-day due to increasing livestock population and decreasing land under fodder cultivation and also due to over grazing in the existing grasslands. Sub-clinical trace minerals deficiency is also more common in India, and it is responsible for substantial economic losses to livestock farmers due to impaired growth, health and production potential of animals (Taneja, 2012). Thus, there is urgent need to address problem of feed, fodder and mineral shortage in a comprehensive manner.

Livestock Health: In addition to management, the animal health plays a major role in progress of livestock industry. Occurrence of diseases causes heavy economic losses in terms of livestock health and production. Introduction of exotic breeds have increased the incidence of newer diseases especially Foot and Mouth Disease (FMD), Haemorrhagic Septicaemia (HS), *peste-des-petits ruminants* (PPR), Brucellosis, Mastitis, Blood protozoan diseases etc. Unless we make sincere efforts to control and manage these common diseases, we will be far away from achieving the targeted meat and milk production of 2030.

The economic losses due to infectious diseases are tremendous as they cause death of young animals, reduction in milk yield and lower quality and quantity of meat, abortion, infertility and poor quality of semen. FMD is one of such most important diseases that also leads to serious economic impact in terms of rejection and trade embargo of livestock and livestock products destined for export. HS and brucellosis affects cattle, buffaloes, sheep, goats and pigs. Mastitis is a multi-factorial problem of dairy animals affecting milk production adversely. The loss caused by mastitis is due to reduced milk production, cost of treatment and culling of animals. The small ruminants like sheep and goats, which play critical role in socioeconomic development of the rural poor, also suffer with many diseases of different origin, most importantly PPR and bluetongue. The economic loss due to PPR is mainly through mortality of adult population and poor carcass quality. Pig is an important livestock species, which plays crucial role in the livelihood in north-eastern states of the country. There are several diseases like FMD, swine fever and HS, which cause severe economic loss to the pig industry. Poultry industry is growing exponentially but it is under constant



threat from various diseases like avian influenza, infectious bursal disease, Newcastle disease (ND), chronic respiratory disease (CRD), salmonellosis, fowl pox and coccidiosis etc.

Climate Change: The global climate change is harmful to both human beings and animals. Inter-Governmental Panel on Climate Change has projected that by the end of this century global earth temperature is likely to increase by 1.8-4.0°C; which could potentially lead to scarcity of water and food resources and may also cause spread of infectious diseases and heat-related deaths. Further, such changes are expected to increase the risks of vector-borne and other diseases leading to change in pattern of disease transmission. The massive outbreaks Bluetongue in Europe and Rift Valley Fever in goats in East Africa are two documented examples of increased vector-borne disease risk associated with climate change. Further, the microbial agents and their vectors that are sensitive to factors such as temperature, humidity, precipitation, surface water, wind and changes in vegetation, are emerging and re-emerging infections and are bound to have impact on heat-related mortality and morbidity of animal hosts.

Quality and Safe Livestock Products: The rapid urbanization and change in human life style demands consumer friendly livestock products such as low-calorie, low-cholesterol, low-salt, high-dietary fibre and fortified or fermented products suiting to their health requirements. Moreover, microbial contamination, antibiotic residues and adulteration in milk, meat and animal feed is rampant (Taneja, V.K., 2012). In the WTO era, wholesomeness parameters related to microbiological standards, handling, processing practices, temperature abuse indicators and residual analysis need to be addressed. This can be achieved by assessment of risks and development of rapid screening methods including biosensors, development of simple technologies for quality enhancement of meat from spent animals, field kits for meat speciation, sex identification, protocols for food safety assurance and quality control with special emphasis on TQM, HACCP and 'production-to-consumption' approach. Newer technologies for value-addition, bio-preservation, eco-friendly packaging and quality control are required for effective utilization and improvement in quality as well as shelf life of milk, meat, poultry, eggs as well as their products and byproducts.

Utilization of Technological Advancements: Recent advancement in molecular biology, biotechnology and nanotechnology has revolutionized the field of animal disease diagnosis and prophylaxis. Now pen-side and sensitive sero-diagnostics using synthetic and recombinant antigens are available for many diseases, which are very useful in sero-surveillance. Further, nucleic acid based



diagnostics like PCR, Real time PCR, probe based diagnostics for detection of important diseases like IBR, FMD, HS, swine fever etc are now being used routinely. Many laboratories are working towards developing high throughput chip based diagnostics for important diseases of livestock. Biotechnology and nanotechnology developments have also revolutionized the field of vaccinology including vaccine delivery systems. Recombinant and new generation vaccines are being developed that have the advantages of better immunity and long shelf life. Biotechnology tools are also being used to improve our indigenous breeds using transgenic and stem cell technology.

Interventions Required

- Support to livestock farmers for improving productivity of existing low input production systems.
- Reorientation of research activities for exploitation of genetic potential of indigenous breeds which are adaptable to adverse climatic conditions and *resistant to various endemic diseases*.
- Strengthening overall animal health cover through prevention, control and eradication of various disease conditions.
- Launching of systematic disease control and eradication programmes for OIE listed diseases along with effective disease surveillance.
- Focus on production of quality livestock products as per the international standards for food safety.
- Emphasis on value addition and development of convenient innovative milk and meat products.
- Ensuring quality, safety and suitability of livestock products for human consumption especially with reference to contaminants, toxins, pathogens, pesticides and antibiotic residues.
- Identification and upgradation of municipal slaughter houses.
- Training programmes for milk and meat handlers regarding hygiene and sanitation.
- Cold chain and suitable marketing network as an integral part of production and processing of milk and meat.



- Exploiting use of by-products of livestock particularly cow urine and dung.
- Efficient utilization of slaughter house waste for sustaining meat industry and clean environment.
- Better management of farm yard manure through composting and bio-gas plants
- Increased emphasis on traceability of livestock and livestock products
- Mitigating the adverse effect of climate change by strengthening research on allele mining for abiotic stress management, geographic information system (GIS) based pathogen-specific bioclimatographs for reliable disease forecasting and monitoring and physiological, nutritional and managerial strategies.
- Care of health status of animal to ensure food safety and nutritional security through livestock products.
- Promotion of commercial aspects of livestock production due to changes in agriculture and socio-economic conditions.
- Public-private partnership to improve the infrastructure facilities for production, processing and marketing of livestock products.
- Strengthening the niche areas of veterinary education and training towards global competitiveness and introducing new specialized trainings in the emerging areas.

Conclusions

In India, the livestock production and agriculture are intrinsically linked, each one being dependent on the other and both are crucial for the overall food security of the people. Livestock sector plays an important and vital role in providing nutritive food rich in animal protein as well as supplementing the family income and generating gainful employment in the rural sector, particularly among the landless, small, marginal farmers and women rearing the animals as their dependable "bank on hooves" in times of need.

The livestock sector has emerged as one of the key components of agricultural growth in India. Role of livestock sector is crucial to fulfill the fast growing food demand which is expected to increase by 40% by 2030 and shall almost be doubled by 2050. The demand can be effectively met with by enhancing the numbers of



highly productive animals, improving feed their utilization efficiency, adopting better reproductive strategies and improving health coverage based on newer generation vaccines and drugs. Nevertheless, concerted efforts in terms of better health, feed and fodder availability, climate mitigation technologies, proper breeding management and extension are required to through sufficient skilled and equipped human resource in order to harness the untapped potential of livestock sector in a balanced and sustainable manner as it holds the key to effectively address the rural empowerment, employment generation, sustainable development as well as livelihood and nutritional security.

References

<http://www.fao.org/ag/againfo/themes/en/meat/background.html>

<http://dahd.nic.in/about-us/divisions/national-livestock-mission>

<http://dahd.nic.in/about-us/divisions/livestock-health>

<http://faostat.fao.org/site/339/default.aspx>

<http://faostat3.fao.org/home/E>

<http://apeda.gov.in/apedawebsite/index.html>

<http://ninindia.org/dietaryguidelinesforninwebsite.pdf>

Taneja, V.K. (2012). Report of the working group on animal husbandry and dairying. 12th five year plan (2012-17), Planning Commission, Government of India, New Delhi, pp. 130.



CONTRIBUTION OF LIVESTOCK, POULTRY AND FISHERY SECTORS ON EMPLOYMENT GENERATION

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- Livestock sector is an important sector of employment generation for rural households and particularly rural women.
- Livestock production provide sustainable source of employment and source of income which helps in reduction of rural under-employment for unskilled labour.
- Livestock production has multiplier effects on economy in India. According to FAO (2011), an additional US \$ 1 spent on primary livestock production generate US \$ 4.7 in national house hold income, compared to US \$ 4.3 in fruits & vegetable, US \$ 3.6 in crops & US \$ 2.9 in manufacturing & services.
- According to one report (www. Indiastat.com) 65 per cent of India's rural farm house hold have marginal land holdings of less than 1 hectare. These households own 20% of all land but more than 50% of all cattle, small ruminant, pig, poultry and about 45% of India's buffalo which indicates that the livestock sector has potential to become hub of employment generation. (Table 18)
- In a recent study it has been estimated that the production of 1,000 liters of milk alone on daily basis by small, medium and large producers, respectively, creates 230, 97 and 25 jobs in India (Staalet *al.*, 2008)
- Livestock sector engaged 8.8% of agriculture labour force in 2005 with women comprising between 70 & 80 per cent of the work force.
- It is believed that 90 per cent of employment in primary production is in rural areas. However, a similar number of Jobs in marketing and processing are in the urban areas.
- The employment under Animal Husbandry is more inclusive with 69 per cent of the persons employed belonging to SC/ST and OBC.
- In order to fully exploit employment generation in livestock sector some of the following constraints and challenges need immediate attention of the policy planners:



- (i) To improve public expenditure on Animal Husbandry Sector.
 - (ii) To improve breeding programmes.
 - (iii) To address issues of scarcity & quality of feeding & nutrition, initiatives are needed so that production system should sustain rising cost of feed ingredient as well as fodder crops.
 - (iv) The livestock production system must address environmental issues such as methane mitigation as well as pressure on water resources. Efficient production system need to be developed to respond to these challenges.
 - (v) To initiate low cost animal healthcare services & control of infectious diseases.
 - (vi) Better monitoring support & value chains.
 - (vii) Farmers access to credit and insurance
 - (viii) Strengthening of Livestock advisory and extension services.
- Fisheries sector has emerged as one of the fast growing food production system during last three decades.
 - With 8 million tonnes of fish production, India ranks second in global context.
 - Haryana has contributed significantly in the field of inland fishery in recent years.
 - The state occupies second place in productivity (5600 Kg/ha) in the country and has good potential for fishery development through diversified farming to enhance employment generation and farmer's income as well as nutritional security.
 - Fishing sector contributes towards agriculture GDP (5.4%) and National economies (1.1% GDP) and employment generation (14.5 million people)
 - (HaryanaKishanAyog Report, 2012)
 - The total fish yield can be projected to reach 1, 45,250 tonnes by 2017. Expected fish production will be 3, 50, 730 tonnes by the end of XII Plan (2017-22).
 - Success story of a farmer at village Lahli, Rohtak – Earn Rs. 3 Lakhs per harvest from shrimp production.



EMPLOYMENT OPPORTUNITIES IN THE LIVESTOCK, POULTRY & FISHERIES SECTORS

Dr George John

Vice-Chancellor

Birsa Agricultural University, Ranchi

* Prelude: These sectors contribute significantly to GDP- thematic approach is presented.

(A) Entrepreneurial opportunities

1. Farm operations

- Dairy, Poultry & Fisheries
- Ranging from backyard to large integrated systems

2. Animal products and by products

- Dairy, Poultry & Fishery products; Indian dairy products advantageous
- Leather & Allied products
- Enzyme, Sera, Slaughter house wastes

3. High end operations / services

- Diagnostics – Conventional
- Molecular
- Vaccines – Conventional & new generation
- ET and related technologies
- Genetic screening in livestock
- Embryo Sexing
- Semen Sexing

(B) Conventional opportunities

1. Teaching : Agricultural Universities, ICAR institutions etc.
2. Research: as above.
3. Developmental activities through:

State Govt., Central Govt., CGIAR institutes, MPEDA, BOBP, Banks, NDDDB, NFDB, FFDA, BFDA, NGOs and Self Help Groups.



Technical Session III

SUBTHEME: Contribution of Livestock, Poultry and Fishery Sectors on Employment Generation

RECOMMENDATIONS

- There is a need for skilled man power as its requirement is increasing day-by-day with increase in milk, meat and egg production.
- “Service delivers” should be improved for all sectors especially for pig farming.
- More focus needs to be given for genetic screening of livestock, embryo sexing and semen sexing.
- Accredited laboratories in private sector and livestock waste management need more manpower.
- Indigenous breeds are to be conserved





Day 2 (29.05.2016)

Technical Session IV

**SUBTHEME: ORIENTING AGRICULTURAL RESEARCH
FOR VOCATIONAL EDUCATION**



DAY 1 (1982)

Technical Session IV

SYSTEMS ORIENTED ALGEBRAIC RESEARCH
FOR VOCATIONAL EDUCATION

INTEGRATION OF CLIMATE RESILIENCE CROP AND LIVESTOCK PRODUCTION

Prof. Purnendu Biswas

Vice-Chancellor

W.B. University of Animal & Fishery Sciences, Kolkata-700037

- Climate change is an inevitable phenomenon caused due to uncontrolled human nuisance. It is a major issue for survival of many species, ecosystems and sustainability of production system.
- Climate change assumed to be most threatening to overall food production systems because livestock production and agriculture due to high dependence on climate and weather are most vulnerable to climate change and since people involved in these sectors tend to be poorer compared with their urban compatriots the livelihoods and food security of billions of people who depend on agriculture and allied sectors are seriously affected.
- Agricultural activities contribute significant amounts of greenhouse gases into the atmosphere, which in turn makes the biosphere more complicated. Hence development strategies need to be scrutinized for its 'clean' credentials where livestock rearing seems to be the major victim of, and a minor contributor to, climate change.
- The projected impacts of warming trend in India are likely to further aggravate field fluctuations of many crops thus impacting food security.
- High concentration of carbon dioxide level in the atmosphere has a fertilization effect on crops with C3 photosynthetic pathway and thus will promote their growth and productivity.
- More variable weather, drought and flooding create the most obvious damage, but hot summer nights, warmer winters, delayed or early monsoon, longer growing seasons and other environmental changes have more subtle but far-reaching effects on plant and livestock growth and development.
- Modified management practices like boosting up of soil organic carbon build up, water harvesting and recycling for supplemental irrigation, growing drought and flood tolerant varieties, improved livestock feed



and feeding methods, supplementation of critical nutrients, etc. seems to be beneficial to combat climatic vulnerability.

- *Resilient Agriculture* and Livestock business is today's concept to recognize the critical role that sustainable agriculture/livestock enterprise will play in the coming decades and beyond. Building resilience starts with reducing vulnerabilities: a system is more resilient if it is less vulnerable. Climate resilient locally adopted crops and livestock breeds need to be identified.
- The carbon foot-print from agriculture and allied sector is meager yet need to be further reduced to make the production system trustworthy keeping in view the challenge to cater the need of exploding human population.
- Capacity building needs to be given importance for mitigation and management strategies to combat the effect of climate change directly on the growth and production of crops and livestock.



ORIENTING AGRICULTURAL RESEARCH FOR VOCATIONAL EDUCATION

Dr. D. L. Maheshwar

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University of Horticultural Sciences, Bagalkot

- Agriculture is the main source of livelihood for over 80% of the rural poor in India.
- Although, it employs about 52% of the labour force, it contributes to only 14.4% of GDP and 10.23% of all exports.
- Rural women, who constitute 30% of the agricultural work force, are amongst the least paid workers.
- Any effort of poverty reduction and economic development must address the problems being faced by the agricultural sector and turn the challenges into economic opportunities for the poor.
- India achieved spectacular agricultural growth since 1966.
- Similar enhancement in production of milk, fish, oilseeds and fruit & vegetables has also been observed.
- Green, blue, yellow and white revolutions have been responsible for bringing in prosperity to the farming community.
- The cradle of the success, besides government policies and high receptivity of the farming community, has been the establishment of institutions of higher agricultural education.
- These institutions developed new breed of skilled human resource that were instrumental in not only generating new technologies but also in their assessment, refinement and dissemination to the farming community.
- Human Resource development is critical for sustaining, diversifying and realizing the potentials of agriculture.

VOCATIONAL AND TRAINING EDUCATION IN INDIA

- The National Policy on Education (NPE), 1986 (as modified in 1992) Keeping in mind that the education system should cater to the needs of the manpower requirement for the economic development of the country.



- Government of India has accorded high importance to vocational education and training.
- While elaborating on the essence and role of Education, the National Policy on Education (NPE), 1986 (as modified in 1992) has recognized that Education develops manpower for different levels of the economy.
- The NPE also envisages the introduction of systematic, well-planned and rigorously implemented programmes of vocational education, which can be rigorously implemented to enhance employability, reduce the mismatch between demand and supply of skilled manpower and to provide an alternative to those pursuing tertiary education, without particular interest or purpose.
- The policy envisages that efforts will be made to provide children at the higher secondary level with generic vocational courses which cut across several occupational fields and which are not occupation specific.
- In this connection University of Horticultural Sciences, Bagalkot, Karnataka is regularly organizing vocational educative programmes like bouquet making, Palm climbing in Coconut Orchard, Protected cultivation of flowers and vegetables, Post harvest management and value addition in horticulture crops, Integrated nutrient management practices, one month residential skill development in horticulture training to rural youths, scientific preparation of Bordeaux mixture, creating awareness on PPVFRA etc.

Few Issues on Agricultural Research for Vocational Education

1. Employability and Demand and Supply matching
2. Informal Sector's requirement
3. Multiple skills
4. Flexibility of Course design, modularity
5. Out of School Children
6. Open and distance learning
7. Use of Technology
8. Linkage to local demand
9. Career guidance
10. Teacher's Training and Retention



11. National Vocational qualification system Skill requirement in – Curriculum, Assessment and Certification
12. Emerging Sectors
13. Involvement of Industry and Civil Society
14. Horizontal and Vertical Mobility
15. Equity (Girls, rural population, SC, ST, Minority and Disabled)
16. Financing
17. State Government's Role

The challenges are immense and in order to achieve the goals there has to be substantial expansion of quality technical/ vocational education and training for raising employability and productivity.



ORIENTING AGRICULTURAL RESEARCH FOR VOCATIONAL EDUCATION

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To develop practical skill and competencies in agricultural research based on the objectives of vocational agricultural education includes professional, managerial, operational, behavioural, inter personal and inter functional skills. To achieve this goals, India needs flexible agriculture education and training system that will provide the foundation for learning, secondary and tertiary education and to develop required competencies as means of achieving lifelong learning. Since the future knowledge and technology lead agricultural and secondary farming growth would be based on human resource with knowledge and skill in various agricultural and allied fields. The urgent need for improving the quality and quantity of manpower development in our youths through technical vocational education in the area of agricultural education has attracted the attention of NARES of the country.

Objective of Agricultural Research for Vocational Education

- More effective use of land conservation and other natural resources, agro inputs, labour and capital in agriculture for increase of efficiency, production and yields in agriculture and improvement of the quality and preparation of agricultural products and of their appropriate processing through secondary farming.
- Promotion of mechanization to reduce harvest losses and production cost.
- Providing appropriate vocational guidance for retaining rural youth into the various branches of agriculture.
- Overcoming of problems of seasonal unemployment and of underemployment in agriculture;
- Improvement of rural life generally and the promotion of greater satisfaction in agricultural work.



Higher level vocational agriculture education

In higher level agriculture education (UG & PG) RAWE, Students READY, Experiential learning, In plant training and Hands on training programme should be scheduled like vocational training for betterment of the students for entrepreneurship.

Thrust area for research on vocational agricultural education

- Output market connections
- Equipment maintenance Agro-processing
- Agribusiness
- Primary agricultural occupations, including: Crop production, Livestock, Poultry, Fisheries, Processing, Machinery, Agro-industry
- Soil science lab technician
- Agro-processing
- Junior Farmer Field and Life Schools (includes business training)
- Livestock rearing
- Fish hatcheries
- Microenterprise
- Agribusiness Farm management

Polytechnic Courses Covered In Different Areas

Poultry Production, Fisheries/Fish Processing, Dairying, Sericulture, Apiculture, Floriculture, Plant Protection, Agricultural Chemicals, Inland Fisheries, Plantation Crops and Management, Seed Production Technology, Swine Production, Vegetable Seed production, Medicinal and Aromatic Plant Industry, Sheep and Goat Husbandry, Repair and Maintenance of Power Driven Farm Machinery, Veterinary Pharmacist-cum-Artificial Insemination Assistant, Agro Based Food Industry (Animal based), Agro Based Food Industry (Crop based), Agro Based Food Industry (Feed based), Post Harvest Technology, Fish Seed Production, Fishing Technology, Horticulture, Soil Conservation, Crop Cultivation/ Production.



Short duration Agro ITI courses for Rural Youths

- Seed Production
- Organic Farming
- Kitchen Gardening
- Dairy Farming
- Flower Dehydration
- Tissue Culture
- Poultry Farming
- Gender Friendly Equipment's for farm Women
- Farm Power Machinery
- Bio-fertilizers & Bio pesticides
- Soil water plant analysis
- Productive & beneficial insects
- Commercial Mushroom production technology
- Artificial insemination



Technical Session IV

SUBTHEME: Orienting Agricultural Research for Vocational Education

RECOMMENDATIONS

- Priority should be given to come out with resilient crops and reduce carbon foot print in livestock farming.
- Regulatory bodies should be available to draw out content delivery to satisfy industry requirement.
- Polytechnic institutions to be promoted with flexible option.
- Employability and demand potential to be identified in a scientific basis.
- Establishing linkage to local demand and equal gender involvement.
- Improving entrepreneurial skills in students which should enable resources conservation and overcome seasonal unemployment.

ANNUAL REPORT

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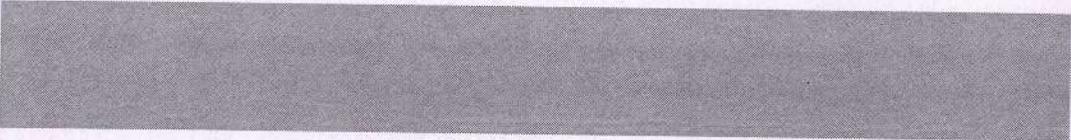
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Technical Session V

**SUBTHEME: ROLE OF AGRICULTURAL EXTENSION IN
VOCATIONAL EDUCATION**



Technical Session V

PLUTONIUM REACTIVITY COEFFICIENTS IN
THE ADVANCED REACTOR

INCUBATION CENTER FOR COST EFFECTIVE FARMER FRIENDLY EQUIPMENT DESIGN AND DEVELOPMENT AND RURAL OUTLETS FOR VET-PHARMA SALE

Dr. N. C. Patel

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Preamble

As agriculture plays a crucial role in Indian economy, Agricultural intelligence of the farmers needs to be developed by developing incubation facility which can also host various programs to train new farmers, share equipments, develop their markets, and learn from mentor farmers, agricultural professionals and each other. Further, income growth from non-farm business (i.e. animal farming, tool/equipment design and production, storage and processing etc) at the household level is also very important for the overall growth. Once their businesses become viable, the new producers move off from the incubator farm and to own.

The livestock species play very important social, cultural and economic roles for rural households in India as they contribute to improve income and wellbeing of the farm families. A large number of infectious and metabolic diseases prevalent in Indian livestock have serious implication for animal productivity, export potential and safety/ quality of livestock products, and many of these diseases have zoonotic implications. In rural area, livestock is commonly affected by parasitism as well as digestive disorders, which result in to malnutrition / nutritional deficiencies. The current efforts of treatment and control of livestock diseases need to be strengthened. There is a shortage of veterinary and para-veterinary facilities including mechanisms for treatment and prevention of the diseases particularly in rural areas. Such conditions can be treated at door steps by providing medicament / pharma products of allopathic or herbal origin prepared at local level by trained vet pharmacists. Rural Pharma Industry only constitutes 21 % of the total Pharma Market.

Rationale

In the present scenario, where labour intensive routine farm operations are becoming increasingly difficult, the availability of labour saving farmer friendly, versatile and cost effective farm equipment and devices play a significant role in farm economics. Existing machines available in the market are being developed by various industries located at distant locations or abroad, which create a lot of hassle and efforts to make the equipment workable or get repaired. Traditional



and time tested tools, crop handling equipment, storage structures, processing technologies etc require capacity enhancement. The modern machines developed at various locations need to be customized for capacity or suitable arrangement or alterations need to be done by partial or complete replacement of various parts whenever required using local available facility and materials. The center may also be involved in developing cost effective and farmer's friendly technologies, entrepreneurship trainings to the rural youth for establishment of small farm machinery workshops, processing equipment etc.

Entrepreneurship in India is on the fast growth. This also throws new opportunities for exploring the new measures for social welfare. Animal health is an integral part of rural upliftment as it ensures better production thereby improving income to the farmers. Any new approach of applying scientific inputs should begin with 'incubator' – the place where startups are born. A startup is incubated in Incubation Center, which gives a chance to bring the business in shape, before it reaches out to the masses.

Traditional and time tested medicinal practices followed in rural areas for combating various animal diseases require strengthening and documentation. Rural marketing activities of many pharma companies have been traditionally restricted to markets with stocks of the concerned product. An inventory of traditional Indian medicinal practice for animal health can be prepared for adoption. Other alternate systems of medicine adopted in the country can be used for ailments against which these are effective. For the traditional medicines, the challenges include foolproof specifications, procurement of pure ingredients and the quality end product. Through understanding and knowledge of the factors and conditions involved, the quality of traditional medicines can be standardized.

Cost effective farmer friendly equipment design and development-Challenges

Certain challenges faced while designing and developing farm equipments, which are farmer friendly as well as cost effective, are as follows.

1. Average small farm size
2. Traditional tools, practices and equipment
3. Repair and maintenance facility
4. Lack of accessibility to modern tools, practices, technologies
5. Education and skill available
6. Scant availability of farmer friendly design and development research



Rural Marketing of Vet-pharma sale– Challenges

In spite of the large clientele existing in rural areas for Vet-pharma sale, marketing of Vet-pharma products in the rural areas is challenging because of following factors.

1. Highly disbursed and thinly populated markets
2. Reliance on local chemists/Neem Hakims and penetration of spurious drugs
3. Unavailability of stockists and skilled sales force
4. Lack of proper distribution network/supply chain
5. Storage infrastructure
6. Poorly educated rural population
7. Lack of adequate qualified doctors
8. Lack of awareness of ailments or symptoms
9. Absence of market research

What is making the rural market attractive?

- Developing infrastructure
- Rise in rural income levels
- Penetration of rural insurance
- Thrust on rural health care program
- Brand Loyalty
- Competition in Urban Market

Approaches for vet-pharma sale

1. Generic drugs purchased from big pharma company can be supplied/dispensed to farmers as per advice of field veterinarians. This will make available the required medicine at cheaper rates to farmers.
2. By preparing drugs/preparations/formulations at local level (In two ways)
 - Pharmacy preparations which are still used today like ointments, liniments, mixtures, lotions, tinctures etc (compositions available in books, are being taught even today)
 - Herbal medicament can be prepared and packets be given to farmers like tonic powder, galactogogue preparation, anti diahorreal powder,



laxative- purgatives, herbal skin preparations, ointments etc. (the compositions are available).

Small Scale Veterinary Pharmacy

With due consideration to less than optimum infrastructural and financial resources, Vet-Pharmacy in the rural areas can remain sustainable only through utilization of available and cheap resources. Following facilities and modalities are suggested for small scale sustainable Vet-Pharmacy in rural areas.

- Infrastructure & instrumentation required
 - Three-four rooms
 - Office cum inventory with all formulations
 - Preparation room having mixture grinder, homogenizer, blender etc.,
 - Packing unit with tablet/bolus making machine
 - Storage and dispensing room (pharmacist required to be employed)
- Continuous supply of authenticated herbal ingredients be assured.
 - Forest department should promote sowing of important herbs locally – with some incentive.
 - Locally grown herbs should be selected for medicinal preparations.
 - Government farms can be used for sowing medicinal plants.

Such small unit can be established to supply such products in cluster of 10-15 villages.

Incubation centre

The facility may be designed to assist the potential entrepreneurs/businesses to become established and make them profitable during the startup phase. The incubation centre provides entrepreneurs and start-up companies with the expertise, tools, networks and environment they need to make their ventures successful. Incubator for graduates in the educational institutes helps in creating jobs, wealth and commercializes new technologies.



The entrepreneurial regions have better economies due to:

- higher employment growth
- higher wage growth
- higher productivity
- These benefits are associated with
 - more R&D
 - more patents per employee
 - more hi-tech establishments
 - more college-educated population

The Incubation has four phases;

1. Pre Incubation: Research support, training, business Planning
2. Early Stage: Advice, Marketing, Technical, Legal, Accounting
3. Classic Incubation: Accommodation, Funding Access, Network, Support
4. Graduation: Marketing Close Support

The Start of Initial Operations of an incubation centre requires:

- Involvement of the start-up/ potential entrepreneur
- Continuing programs for improving management skills of incubator staff and tenants
- Links to other SME programs
- Exchanges of information

The sustainability of the operations of an incubation centre needs imaginative ways of raising funds and income; macro-economic policy structure and regulatory framework that encourage entrepreneurship. The feasibility study is an important and necessary step to design the business incubator. The feasibility is assessed on the basis of;



1. Market (need analysis)
2. Stakeholder-Community support
3. Facilities and Services
4. Infrastructure
5. Financial feasibility

Establishing the incubation centre will require the full involvement of the universities or R & D institutions besides the other stakeholders. The incubation center management needs to generate resources for the same – in terms of capital, manpower and time. For an individual or an institute, it is prudent to setup a project team to take up the task in a systematic manner. Government support provides some subsidy towards this, but comes with its own costs. Once the incubation center is setup, it is very important to establish industry linkages – maybe even before the first company starts operations. This may include contact with local entrepreneurs, lawyers, CAs, industry associations like CII, FICCI, Nasscom etc. and media (TV, print etc).

Conclusions

Effective planning and execution alone would not make Incubation centre a success. The presence of an outstanding R&D institution alone does not cause the development of viable technology and industries. The Technology Business Incubator (TBI) and the host institution are envisaged as a service function that can strengthen the trend towards technology business and entrepreneurship, but they cannot create the trend. If TBIs are to be of significant value in promoting industries and generating jobs, the economic and cultural seedbeds need careful preparation to receive the entrepreneurial seed.

The government, financial institutions and university all have a significant role to play in creating an environment conducive to the growth of TBIs and high technology industries. At the same time, TBIs alone are not sufficient to stimulate advanced technology development. Rather, TBIs are one of the services that the community possesses to create a growing, advanced technology industry.

REFERENCES

1. Chandrasekhar S. and Mehrotra N. (2016) Doubling farmers' incomes by 2022 What would it take?. Economic & Political Weekly. VolLI(18). Accessed on May 19, 2016 (http://www.epw.in/system/files/pdf/2016_51/18/Doubling_Farmers'_Incomes_by_2022_0.pdf)



2. Chapel H. (2014) Developing a Strategic Plan for Regional Farm Incubation. Piedmont Conservation Council Inc., Durham.
3. DRG-RBI (2008) Study on "Agricultural Growth in India since 1991". Press Release: 2007-08/1663. Accessed on May 19, 2016 (<http://rbidocs.rbi.org.in/rdocs/content/pdfs/85240.pdf>)
4. Ghadiyali T., Lad K. and Patel B. (2011) Agriculture Intelligence: An emerging technology for farmer community. Second international convergence on emerging application of information technology. IEEE, Kolkata. Accessed on May 11, 2016 (<http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=5734974>)
5. Jurgen B. (2000) Project Selection, Monitoring and Evaluation for technology Incubation in Developing Countries. Regional Consultative Meeting on Strengthening Technology Business Incubators Systems for Creating High Technology based Enterprises, 29-31, August 2000, Seoul, and Republic of Korea.
6. Jurgen B. (2000). Project Selection, Monitoring and Evaluation for technology Incubation in Developing Countries. Regional Consultative Meeting on Strengthening Technology Business Incubators Systems for Creating High Technology based Enterprises, 29-31, August 2000, Seoul, and Republic of Korea.
7. Lalkaka R. (1996) Technology Business Incubators: Critical Determinants of Success. Annals of the New York Academy of Sciences, vol. 798.
8. Menon P.K.B. (2000) Technology Incubation Systems in India. International Center for Scientific and Technical Information. Accessed on May 11, 2016 (http://web.icsti.su/rus_ten3/1000ventures/a/countries/india)
9. National Livestock Policy (2013). Government of India, Ministry of Agriculture Department of Animal Husbandry, Dairying & Fisheries. (<http://dahd.nic.in/sites/default/files/NLP%202013%20Final11.pdf>)
10. NSS-SAS (2016) Situation assessment survey of agricultural households 70th round. National Sample Survey Office, Ministry of Agriculture, Government of India. Accessed on May 19, 2016. (http://mospi.nic.in/MospiNew/upload/NSS_Report_573_16feb16.pdf).



ROLE OF AGRICULTURE EXTENSION IN VOCATIONAL EDUCATION: SALIENT FEATURES

Prof. Uma Shankar Sharma

Vice-Chancellor

Maharana Pratap University of Agriculture and Technology, Udaipur

- Extension Education in agriculture and allied areas is mainly concerned with the fruitful dissemination of technologies.
- It envisages the act of transferring innovation through appropriate vocational education.
- The extension system operates as a farmers' programme with active participation of the scientists and extension functionaries.
- Vocational Education and training is an important element of the nation's education initiative.
- The role of agriculture extension education in facilitating vocational education including social and economic progress has long been recognized.
- Skills and knowledge, as the basic components of extension education, are the engines of economic growth and social development and they can be developed through vocational education.
- Vocational education for practicing farmers, farm women, and young farmers is a critical input for accelerating agricultural production as a long term strategy and it is only possible through an enhanced agriculture extension network.
- Agriculture Extension institutions like KVKs are designed to impart skill oriented vocational trainings through work experience and 'learning by doing'.
- The cost of transfer of technology is still very high and long term vocational education can play a vital role in reducing the cost.
- Only providing inputs at farmers' door step will not solve the problem. We need to educate them on various vocational aspects for developing secondary source of income.



- The extension agencies need to establish strong linkages with radio, FM and TV channels for effective communication of latest technical know-how/skills to the farmers in shortest possible time period to impart vocational education.
- Exploitation of facilities like video conferencing, WLL (Wireless in local loop), internet, personnel management system, social networking, kisan call centres, etc are demanded in the changing scenario of Agriculture.
- They need to develop location specific and time based radio and TV programmes for highlighting the package of practices for production of crops, fruits, vegetables and livestock production. This will promote the vocational education in the country.
- The Extension agencies need to establish a Technology Museum and Park at all technology transfer centres to expose the visiting farmers with new research developments.



MASS PROMOTION OF ORGANIC FARMING FOR A HEALTHY LIVESTOCK AND WELL - BEING OF CONSUMERS

Dr. Manmohan Singh, IAS

Vice-Chancellor

Sri Venkateswara Veterinary University, Tirupati, AP

Human health hazards are associated with intensive modern agriculture due to presence of Agrochemicals, veterinary drugs, antibiotic residues etc in animal products and groundwater contamination. However, these days, consumer awareness has increased and the demand for environmentally safe and chemical-residue free healthy foods is increasing rapidly. Such concerns and problems posed by modern-day agriculture have forced us to go back to nature for sustainable production and in the process new concepts in farming, such as organic farming, natural farming, biodynamic agriculture, do-nothing agriculture, eco farming, etc have taken shape.

Organic animal husbandry is a system of livestock production that promotes the use of organic and biodegradable inputs from the ecosystem in terms of animal nutrition, animal health, animal housing and breeding. It deliberately avoids the use of synthetic inputs such as drugs, feed additives and genetically engineered feeds/ breeding inputs. Organic production is knowledge and management intensive. Producers must be well versed in organic production standards, principles and practices, which require a high degree of knowledge and skill. In organic production, it is not simply the final product but the whole production process that must be inspected and approved by the accredited certification bodies

According to a study by Assocham and TechSci Research, the India's organic food market has potential to grow more than 25 percent annually to touch \$1.36 billion by 2020, provided there is more awareness about these products and the government incentivises region specific organic farming. At present, a major share of organic food market goes to organic pulses and food grains. Even internationally, most of the trade in organic livestock products is restricted to the European Union and other developed nations particularly organic beef and a major share going to food grains, fruits, drinks etc thereby trade in other organic livestock products is yet to take off.

Animal welfare is a top priority in organic farming. By law, U.S. organic farmers are required to raise animals without the use of antibiotics or synthetic



growth hormones and must provide animals with 100% organic feed with safe, clean, cage-free living conditions. In addition, organic farmers must provide their animals with access to the outdoors and pasture so that they can roam freely. The livestock production system in our country fits well into the above parameters except for major issues of pesticide/chemical residues in feeds and fodders and availability of adequate green pasture throughout the year. Agro climatic conditions in India and our agricultural biodiversity are conducive for organic agriculture and presently our products are being exported to Europe, US and Japan.

The Ministry of Commerce and Industry, Government of India launched the National Programme on Organic Production and brought out a document that provides information on standards for organic production, procedures for accreditation, certification and other regulations. However, awareness about these procedures in the scientific community, farmers, NGOs etc is very less.

Conventional vs. Organic farming

When looking at comparisons between organic livestock farming systems and conventional ones, several authors have shown that organic systems have a greater potential to preserve the environment, mainly with regard to biodiversity. Organic farming entails reduced use of inputs, better nutrient recycling, less use and exploitation of non-renewable/external resources, and finally, ecotoxicity. The increasing degradation of the agricultural soils and the reduction in the supplies of fresh water are serious problems that are impediments to achieving food security for the growing population and demand for animal products. It is even more relevant to our country because of the pasture-based (low-input/pasture-based/extensive) production systems. Organic livestock systems have the potential to contribute to the sustainability of these areas and improved health, robustness, and longevity of livestock. Cattle on conventional farms are fed approximately twice as much concentrates as cattle on organic farms. Further intensive production is associated with many stress factors working on the animal that reduce their welfare and well being.

Factors influencing organic livestock farms' success

(i) **Transition period** : obtaining a higher price ("price premium") for their organic products is necessary for organic farmers profitability, especially during the years of conversion, because the incomes are often reduced and costs are increased.



(ii) Regulation and certification

Organic production involves using different animal breeds, farm structures, agro-ecosystem managements, feeding and marketing strategies. As a consequence, success of organic livestock farms requires unified criteria for evaluation and certification. The cost of certification is not affordable particularly for small and landless farmers, who play a great role in sustainability and food security.

(iii) Suitability of organic farming

In our country, since ruminants are predominantly reared on grazing/pasture-based production systems it is easier to convert to organic production system than poultry and pigs which require intensive system of production. Moving from species to farming practices, we are in a advantage position since mixed livestock production systems have a higher resilience particularly economically, which would allow an easier transition to the organic system

(iv) Animal nutrition: Legislation and market

Animal nutrition constitutes an important pillar of organic livestock production. In relation to organic feedstuffs, the most important obstacles are the difficulty to find them and their prices. This situation is aggravated by the farmers' high external dependence for feedstuffs. One possible solution for overcoming this barrier would be the use of local agricultural by-products/crop residues produced under organic farming conditions for animal nutrition since their price is usually low and at the same time it allows for environmentally sound method for disposal of the by-product materials.

European regulations limited the use of many feed additives, such as mineral preparations, with the aim that organic livestock farms rely on soil minerals. However, their levels in the feedstuffs is often low that leads to mineral deficiencies especially in the case of dairy cattle. Hence, research on alternate mineral sources like seaweed, developing pastures with high mineral content, fat supplements etc is required. Further, feed resources of the farm are usually of poor quality in many areas, This calls for use of feed additives like limiting amino acids (such as methionine in dairy cows), chelated (also called "organic") minerals, salts of organic acids, yeasts, essential oils, and fat supplements etc. Our organic farming regulations should permit such approaches.



(v) Animal health, welfare, and technical management

The veterinarians normally suffer from lack of knowledge with regard to the management of animal health under organic type of production. The EC regulations for organic farming state that organic livestock should be treated preferably with phototherapeutic products. However, almost no phototherapeutic product is registered for livestock, and information regarding veterinary phototherapy is really scarce. The major issues in organic production are intestinal parasites and achieving adequate nutritional management. Reliance on veterinary drugs has to be reduced that may lead to health related problems and affect profitability. This is the challenge to the profession and research on these aspects is highly essential.

(vi) Marketing of organic products and consumer's behaviour

The lack of well-developed marketing channels and industry, low consumer awareness of organic products, and their unwillingness to pay a premium price for them hinder the demand for organic animal products. As a consequence, most of the farmers are not able to sell their products to the organic market and at a price that allow them to cover their production costs.

(vii) Potential of organic farming to meet the demands of growing population

Over 45% of meat in our country is derived from poultry followed by 19% from buffaloes and 16% from goats. Growth rate in the dairy sector is presently ranging between 3.5 to 4.5%. According to the estimates by the National Dairy Development Board (NDDB), the demand for milk is likely to reach 180 million tonne by 2022. To supply to the market, an average incremental increase of 5 million tonne per annum over the next 15 years would be needed — a doubling of the average incremental rate that has been seen over the past 15 years. Low productivity, deficiency of feed and fodder resources particularly green fodder, diseases, climate stress etc are major impediments to increasing livestock productivity. Further, availability of organic feed and fodder resources, organic therapeutic agents etc is a big issue about which no reliable scientific documentation is available. Even with agriculture, reports say that the available organic resources i.e. fertilizers, insecticides etc can support only 30 % of the present production. Hence, in the absence of reliable scientific documentation and studies it is difficult to predict the potential organic livestock production in meeting the organic livestock product requirements of the population.



However, the following aspects can be encouraged to promote organic livestock production:

- Combining fish culture with agri or horticulture improves water use efficiency and reduces nutrient input in soil for crops. In this way, nutrients are also added in organic form to the water before irrigation, which may subsequently reduce the need for additional inorganic fertilizer application. This reduces the cost and increases net revenue realized.
- Integrated livestock and aqua production systems : Livestock manures represent a valuable resource that, it can replace significant amounts of chemical fertilizers. It is estimated that 40-50 kg of organic manure can produce 1.0 kg of fish in a system. The waste / excreta from 500- 600 poultry birds is adequate to produce manure for a hectare of water area under poly culture. Similarly, the waste from 35-40 pigs or 3-4 cows / buffaloes or 50-60 goats could ensure manuring of one ha water spread for sustaining plankton productivity to support fish culture. Such an approach helps in maintaining C:N ratio in the soil and also increases the fertility and productivity of the soil besides improving the physical, chemical and biological properties of soil
- More than 500 million tons of crop residues are produced which can be effectively recycled as livestock feed in forms such as crop residue based complete feed, nutrient enriched blocks etc or as organic manure. The technology is already developed but its availability to the end users is very limited.
- Promoting use of biopesticides based on local knowledge using cow urine, neem , castor leaf etc on a large scale and extensive research in this aspect is highly essential to assess the efficacy of the approach.
- Similarly we have to bring in lot of awareness on ethno veterinary practices and we need to include them in the curriculum and start PG and PhD programmes.
- Increase the population of recognized indigenous breeds from present 11 to 20 million in phased time frame
- Developing branded animal products from indigenous livestock available with pastoralists and smallholders and creation of niche markets for these products.



Conclusions

- The combination of increasing productivity to meet the needs of a large population and complying with organic farming regulations is not an easy task. Due to this, it is inappropriate to generalize the benefits of organic livestock farming itself, since the feasibility of implementing organic livestock production systems and their consequences varies greatly, and are site and time-specific. A SWOT analysis along with an assessment of the future effects and difficulties of organic farms under specific contexts is really needed. By doing so, it will be possible to design site-specific and successful options that comply with organic regulations and principles, while being sustainable.
- There is a need to design feeding strategies that provide adequate nutrition, especially in areas with environmental constraints, such as arid and semi-arid areas.
- The knowledge of the veterinarians with regard to animal health management must be improved as fast as the sector is growing. The health care protocols must be developed for each species, including research on alternative and indigenous methods of disease prevention.
- Special attention must be paid on the marketing strategies of organic products since this is the main constraint of the sector. Consumers are not confident of the certification mechanism leading to scepticism about the organic nature of the products and distress sale, losses and failure of the organic production system.



Technical Session V

SUBTHEME: Role of Agricultural Extension in Vocational Education

RECOMMENDATIONS

- Setting up of Rural Vet Pharma, involving Indian medicine.
- Focus should be given for entrepreneurship development and agricultural intelligence through Technology Business Incubators.
- Incubators should be developed for 'Start-ups'.
- Small farm machinery workshop has to be established.
- Vocational training to be focused at two levels based on the need and educational levels. Level - I : Short term training by KVKs and training institutes, Level – II : Long term training by scientists of SAUs.
- IAUA to formulate a policy to develop a sustainable model of incubation centres.
- Steps need to be taken to curb mushrooming of private agriculture colleges in the country.



**11th National Symposium on "Positioning NARES for Vocational Education"
(28th & 29th May 2016)**

TECHNICAL PROGRAMME

May 28, 2016

Day 1 (28.05.2016): Technical Session I

SUB THEME: Mainstreaming Agricultural Education for Vocational Education

1200 – 13 30 hrs

Chairman Dr N.S. Rathore
D.D.G. (Edn), ICAR

Co-Chairman Dr. N.C. Patel
Vice-Chancellor, AAU, Anand

Rapporteurs Dr. M. Thirunavukkarasu
Dean, VC & RI, Tirunelveli
Dr. K.N.Selvakumar
Dean, VC & RI, Orathanadu

Panelists Dr. A.K. Singh
Vice-Chancellor, RVSKVV, Gwalior
Prof. Surendranath Pasupalak
Vice-Chancellor, OUAT, Bhubaneswar

Dr. C. Vasudevappa,
Vice-Chancellor, UAHS, Shimoga

Dr. N.K. Dhamsaniya
Registrar, JAU, Junagadh

Time	Title of the Paper	Speaker
1200-1220 hrs	Human Resource needs of agriculture and allied sectors	Dr. K. Ramasamy Vice-Chancellor, TNAUCoimbatore
12 20-12 40 hrs	Mainstreaming Agricultural Education for Vocational Education	Prof. Surendranath Pasupalak, Vice-Chancellor, OUAT Bhubaneswar
12 40-13 15 hrs	Views of Panelists	
13 15-13 30 hrs	Remarks of the Chairman	
13 30-14 00 hrs	Lunch Break	



Technical Session II

SUB THEME: Integration of Skill Development and Polytechnic programmes in Vocational Education

14 00 – 15 30 hrs

Chairman Dr.M. C. Varshneya
President, IAUA

Co-Chairman Dr. George John
Vice-Chancellor, BAU, Ranchi

Rapporteurs Dr. S.A. Asokan
Director of Distance Education, TANUVAS

Dr. B. Muruganandan
Dean, CPPM, Hosur

Panelists Dr. B.M.C. Reddy
Vice-Chancellor, Dr.YSRHU,
Tadepalligudem

Time	Title of the Paper	Speaker
14 00- 14 15 hrs	Integration of Skill Development and Polytechnic Programmes in Veterinary and Animal Sciences sectors	Dr. S. Thilagar Vice-Chancellor, TANUVAS Chennai
14 15- 14 30 hrs	Integration of Skill Development and Polytechnic Programmes in Fisheries sector	Dr. K. Ratna Kumar Officiating Vice-Chancellor, TNFU, Nagapattinam
14 30- 15 15 hrs	Views of Panelists	
15 15- 15 30 hrs	Remarks of the Chairman	
15 30- 15 45 hrs	Tea Break	



Technical Session III**SUB THEME: Contribution of Livestock, Poultry and Fishery Sectors on Employment Generation****15 45-17 00 hrs**

- Chairman** **Maj. Gen. Shrikant**
Vice-Chancellor, LLRUVAS, Hisar
- Co-Chairman** **Dr. C. Vasudevappa**
Vice-Chancellor, UAHS, Shimoga
- Rapporteurs** **Dr. P.I. Ganesan,**
Director, CAHS, TANUVAS
Dr. V. Ramesh Saravanakumar,
Director, CAPS, TANUVAS
- Panelists** **Dr. George John**
Vice-Chancellor, BAU, Ranchi
Prof. Purnendu Biswas
Vice-Chancellor (Actg.), WBUAF&S
Dr. Moirangthem Premjit Singh
Vice-Chancellor, CAU, Imphal

Time	Title of the Paper	Speaker
15 45-16 00 hrs	Animal products, byproducts and post harvest technology - Growth, impact and Employment generation potential	Dr. R.K. Singh Director, IVRI, Izatmagar
16 00-16 45 hrs	Views of Panelists	
16 45-17 00 hrs	Remarks of the Chairman	



Day 2 (29.05.2016): Technical Session IV

SUB THEME: Orienting Agricultural Research for Vocational Education

09 30 – 1100hrs

- Chairman** **Dr. K. Ramasamy**
Vice-Chancellor, TNAU, Coimbatore
- Co-Chairman** **Dr. S. Thilagar**
Vice-Chancellor, TANUVAS, Chennai
- Rapporteurs** **Dr. L. Gunaseelan**
Dean, VC&RI, Namakkal
- Dr. S. Balasubramanian**
Controller of Examinations, TANUVAS
- Panelists** **Dr. D.L.Maheshwar**
Vice-Chancellor, UHS, Bagalkot
- Dr. C.J.Dangaria**
Vice-Chancellor, NAU, Navsari
- Dr. Ravi P. Singh**
Director, BHU, Varanasi

Time	Title of the Paper	Speaker
09 30- 09 45 hrs	Integration of climate resilience crop and livestock production	Prof. Purnendu Biswas Vice-Chancellor (Actg.), WBUAF&S
09 45- 10 00 hrs	Orienting Agricultural Research for Vocational Education	Dr. D. L. Maheshwar, Vice-Chancellor, UHS, Bagalkot
10 00- 10 15 hrs	Orienting Agricultural Research for Vocational Education	Dr. C. J. Dangaria, Vice-Chancellor, NAU, Navsari
10 15- 1100 hrs	Views of Panelists	
11 00- 11 15 hrs	Remarks of the Chairman	
11 15- 11 30 hrs	Tea Break	



Technical Session V**SUB THEME: Role of Agricultural Extension in Vocational Education**

11 30 – 12 45 hrs

Chairman Dr A. K. Singh

Vice Chancellor, RVSKVV, Gwalior

Co-Chairman Dr. Moirangthem Premjit Singh

Vice-Chancellor, CAU, Imphal

Rapporteurs Dr. N.K. Sudeepkumar,

Director of Extension Education, TANUVAS

Dr. D. Baskaran,

Dean, CFDT, Koduvalli

Panelists Prof. Uma Shankar Sharma,

Vice-Chancellor, MPUAT, Udaipur

Dr Gopal Krishna

Director (Acting), ICAR- CIFE, Mumbai

Time	Title of the Paper	Speaker
11 30-11 45 hrs	Incubation centres for cost effective farmer friendly equipment design and development and rural outlets for vet-pharma sale	Dr. N.C. Patel Vice-Chancellor, AAU, Anand
11 45-12 30 hrs	Views of the panelists	
12 30-12 45 hrs	Remarks of the Chairman	



Valedictory Session: 13 00 -14 00hrs

Chairman	Prof. (Dr.) M.C. Varshneya Vice-Chancellor, KU, Gandhi Nagar
Co-Chairman	Dr. N.C. Patel Vice-Chancellor, AAU, Anand
Host University	Dr. S. Thilagar Vice-Chancellor, TANUVAS
	Dr. C. Balachandran Organizing Secretary, Dean, MVC
Rapporteurs	Dr.K. Kumanan Dean, Faculty of Basic Science, TANUVAS
	Dr. R. Jayaprakash Director of Clinics, TANUVAS
1300 -13 30 hrs	Presentation of Session wise Recommendations
1330 -13 40 hrs	Remarks of the Co-Chairman
13 40 -1350 hrs	Remarks of the Chairman
14 00 hrs	Lunch



**TAMIL NADU VETERINARY AND
ANIMAL SCIENCES UNIVERSITY**

IAUA SPONSORED
11th National Symposium on
"Positioning NARES for Vocational Education"
May 28th - 29th, 2016

Plenary Session

The plenary session was held under the chairmanship of Dr.M.C.Varshneya, President, IAUA and co-chaired by Dr. N. C. Patel, Secretary-cum-Treasurer, IAUA. The patron of the symposium Dr.S.Thilagar, Hon'ble Vice-Chancellor, TANUVAS and Dr.C.Balachandran, Organising Secretary and Dean, Madras Veterinary College were also present. One Rapporteur from each session presented the proceedings and recommendations. The President, IAUA and the Secretary cum Treasurer, IAUA thanked the university and the committee for organising the symposium in a befitting manner.



**Indian Agricultural Universities Association (IAUA) sponsored
11th National Symposium on
"Positioning NARES for Vocational Education"
on 28th and 29th May 2016 at Madras Veterinary College, Chennai**

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1	<p>Section 1: Introduction</p> <p>This document describes the structure and content of the project. It is intended for use by all team members.</p> <p>Author: John Doe</p> <p>Date: 2023-10-27</p>
2	<p>Section 2: Objectives</p> <p>The primary objective of this project is to develop a comprehensive framework for data analysis. Secondary objectives include:</p> <ul style="list-style-type: none"> Identify key data sources and collection methods. Develop a robust data processing pipeline. Implement advanced statistical models for data interpretation.
3	<p>Section 3: Methodology</p> <p>The methodology employed in this project is based on a combination of qualitative and quantitative research methods. The process involves:</p> <ol style="list-style-type: none"> Initial data gathering through interviews and surveys. Analysis of collected data using statistical software. Validation of findings through peer review and expert consultation.
4	<p>Section 4: Results</p> <p>The results of the data analysis indicate a strong correlation between the variables studied. Key findings include:</p> <ul style="list-style-type: none"> A significant increase in data volume over the period. Consistent trends in data distribution across different categories. Identification of outliers and their potential impact on the overall analysis.
5	<p>Section 5: Conclusion</p> <p>In conclusion, the project has successfully achieved its primary objective of developing a data analysis framework. The results provide valuable insights into the data trends and patterns observed.</p> <p>Future work should focus on refining the data processing pipeline and exploring additional data sources to enhance the accuracy and depth of the analysis.</p>





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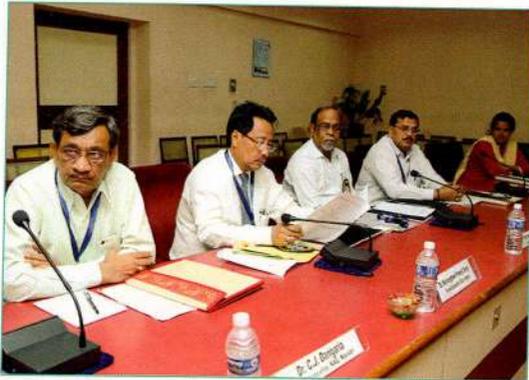


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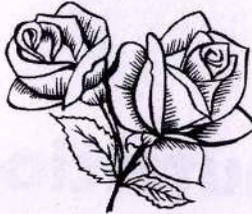
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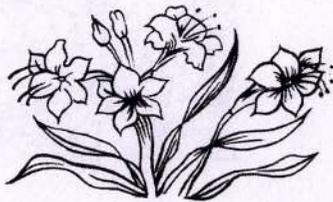
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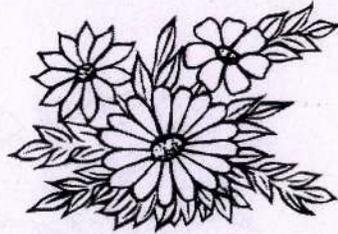
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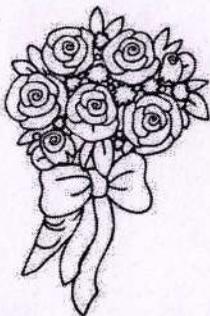
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