Innovative Ideas for Entrepreneurship Development in Livestock Sector

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Editors:

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MESSAGE

National Institute of Agricultural Extension Management (MANAGE), Hyderabad is an autonomous organization under the Ministry of Agriculture & Farmers Welfare, Government of India. The policies of liberalization and globalization of the economy and the level of agricultural technology becoming more sophisticated and complex, calls for major initiatives towards reorientation and modernization of the agricultural extension system. Effective ways of managing the extension system needed to be evolved and extension organizations enabled to transform the existing set up through professional guidance and training of critical manpower. MANAGE is the response to this imperative need. Agricultural extension to be effective, demands sound technological knowledge to the extension functionaries and therefore MANAGE has focused on training program on technological aspect in collaboration with ICAR institutions and state agriculture/veterinary universities, having expertise and facilities to organize technical training program for extension functionaries of state department.

Technology is quickly evolving. Transferring computer hardware and software to the application has been a significant advancement in this process. The use of technological tools has improved the comfort and productivity of farmers' work with animals. Therefore, the primary field of research for animal productivity and sustainability is technological advancements. Animal husbandry has become much more convenient and easy thanks to several technological devices and technologies. This rapid evolution has a significant impact on management decisions and applications. Daily management decisions that must be made in the field of animal husbandry are set up based on their accuracy. Farmers currently have a lot of chances because to smart systems.

It is a pleasure to note that, EAAS Centre, MANAGE, Hyderabad, Telangana is organizing a training program on “Innovative Ideas for Entrepreneurship Development in Livestock Sector” from 19-21st September, 2022 and coming up with a publication as e-book on “Innovative Ideas for Entrepreneurship Development in Livestock Sector” as immediate outcome of the training program.

I wish the program be very purposeful and meaningful to the participants and also the e-book will be useful for stakeholders across the country. I extend my best wishes for success of the program and also I wish many more glorious years in service of Indian agriculture and allied sector ultimately benefitting the farmers. I would like to compliment the efforts of Dr. Shahaji Phand, Center Head-EAAS, MANAGE and team for this valuable publication.

Dr. P. Chandra Shekara
Director General, MANAGE

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Chapter-1

Supply Chain Management in Poultry Farming: Post Covid-19 Mitigation Measures

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Introduction:

Next 18-24 months will be challenging not only for global economy but also for Indian farmers. Animal husbandry activities bring daily and regular income in life of farmers. It will take time to revive consumption of animal proteins in HORECA segments. So demand for animal proteins like milk/products, chicken, mutton, eggs and fish will be lower at least by 30-50% in short term. Around five crores population is dependent on poultry farming directly or indirectly. Around 5 million MT of poultry meat was produced last year (85000 crores worth), but per capita consumption is still at 3.4 kg. Around 109 billion eggs were produced last year (45000 crores worth), but per capita availability is 80 eggs only. Although poultry production is at par with international level and India is number three in egg production and number four in broiler production in the world, it suffered most before and during lockdown period. False messages on social media brought chicken consumption to almost 10% of normal during February 2020. Due to efforts by Government and private sector, it started picking up in second week of March, but again went down during lockdown period due to lack of supply chain and logistics issues.

Only 5% of chicken are processed and sold in chilled or frozen form. Rest is sold as live chicken. There is need to do active promotion of chicken and egg consumption in India. There is need to increase share of processed chicken. There are many misconceptions about eggs and chicken like use of hormones, antibiotics residues, birds in cages, desi eggs - among consumers. There is need of education of consumers, doctors, dieticians, chefs, teachers, etc. Associations should come forward for year-long active promotion through activities like cookery shows. Our exports are negligible.

As schools were closed, mid-day meals including eggs were stopped. Government should give eggs to police, doctors, nurses and other staff of hospitals, Jails, government offices. Poultry meat and eggs should be served in canteens of companies. There is need of development of ready to eat, ready to cook dishes. Poultry sector should learn from dairy sector about how to do value addition and marketing of products. Placements should be planned as per demand. There should be unity among poultry companies working in particular area. New talent should be attracted towards poultry farming. Veterinary college can play important role of coordination among government and poultry farmers and also in training of poultry farmers. Poultry farmers should develop strong relationship with vets working in Animal Husbandry departments and also with politicians to take up

demands with Government. There is need to change syllabus designed by VCI so that students learn more about poultry sector in last year. Industry and college should work with Women self-help groups and farmer producer companies and should help NGOs in promotion of poultry farming. Vets can play important role in growth of poultry sector in short term and long term period.

You are the most important person in life of Indian farmers. He will have to play role of three people – Veterinarian, Extension worker and Trainer (VET) for betterment of animal husbandry sector. We will have to keep our animals healthy as usual. We will have to help our farmers to improve productivity per animal and to reduce cost of production of animal proteins. During lockdown, only those products could reach urban kitchen where supply chain was in place. Farmers needs to be motivated to form Farmer Producer Companies and to build product wise supply chains which includes procurement of animal proteins, primary or secondary processing to increase shelf life and to do value addition, branding and marketing, logistics etc. so that consumers get product of right quality at right price. Farmers should get maximum share out of rupee spent by consumers.

Young graduates should start startups instead of looking for jobs. Startup India and many private venture capital companies are helping startups in animal husbandry sector. Institutes like NAARM, IVRI and NDRI have started incubation centers for startups. Few examples of startups in animal husbandry sector are Teplu, Shekru, Zoofresh, Humpy A2, Sumbran goat farm, powergotha, Milk Mantra, etc.

You should make list of success stories in different fields of animal husbandry. He/she should have knowledge about government schemes and should do handholding of farmers to get maximum benefit out of it. This will help weaker section of the society to do profitable animal agriculture.

Consumers want us to control antibiotic residues and mycotoxins (eg. Aflatoxin) in poultry products. There is need to promote use of herbal plants to treat common diseases. Conventional ways of training and social media should be used to reach large number of poultry farmers. Every farmer has smart phone now a days and during lockdown he has learnt how to use social media like youtube, whatsapp and Facebook, etc. You should help NGOs working with poultry farmers to improve profitability and productivity of animal husbandry sector. There should be trust among all stakeholders who intends to work with farmers.

You are the best person to write and implement various policies of state and central governments. Consumption of animal protein will help to increase immunity of Indian population. There is wrong propaganda by various animal welfare organizations which may affect consumption of animal protein and thereafter profitability of farmers. We should educate all stakeholders about it. You should spare some time to write articles and print it in various media to reach farmers.

So apart from regular duties, you should spend at least 10 hours every week to help our farmers in next 18-24 months to fight bad impact of COVID19 on animal husbandry sector.

I had chat with Narendra of Nandu's Chicken, Bangalore.

What are the customer trends you have noticed in the past few months? Example Offline vs Digital footfall.

Over the past few months, we all have been learning to navigate unchartered territory. Initially, when the lockdown was first announced in March, there was a predominant sense of bafflement at life coming to a standstill. However, gradually, in business as in life, customers are adapting to the 'new normal'.

Traditionally, over 85 per cent of the Indian consumers buy meat from local markets. The meat industry has been largely unorganised in the country, with online players catering to niche sections of the urban population.

The 3 main consumer trends noticed are

- Growing concern on health & hygiene – shift in habit of buying meat: Consumers are preferring to buy their meat from branded and hygienic meat retail stores such as Nandu's instead of buying from the local butchery shop. We have witnessed a growth of 40% of sales via our retail stores.
- Adoption of online purchase: Many consumers are preferring to order online via e-commerce websites and app as well as ordering from online marketplaces – we have noticed a 50% increase in the purchase from our online ecommerce platforms and also on marketplaces such as Dunzo, Swiggy Stores & Zomato Market.
- Adoption and acceptance of ready to eat/cook products which was a very small portion of the business earlier. At Nandu's we have seen an increase of 200% of our Ready to cook/eat and heat and eat category products. The closure of restaurants during lockdown has driven the sales of this category up as at home cooking was the preferred choice.

How do you foresee the future in terms of customer expectations and demand?

- The poultry market in India, currently valued at INR 1.72L crore, is growing at a Compound Annual Growth Rate (CAGR) of about10 per cent. Given the evolving role of the organised market and changing customer dynamics, the potential for growth is immense.
- Owing to the current scenario and the prevailing pandemic situation organised meat retail is set for tremendous growth and omni-channel retail is the future.
- The current socio-economic situation is bound to have a profound effect on customer expectations and demand. Right from hygiene and safety to greater transparency and trust, brands will have to raise the bar to keep the customers satisfied. To avoid supply chain disruptions in the future, customers will expect brands to invest in integrated backend operations and control their own our supply chain.
- I also foresee a greater demand for RTC and RTE value-added products - that not only rank high on convenience, but also on taste. Brands that listen to their customers and evolve will be in the position to drive economic growth in the pandemic and post-pandemic world.

What challenges did you face during the lockdown and how have you overcome them?

When you don't know what to expect, the challenges seem insurmountable. Especially in an unprecedented crisis like the COVID-19 pandemic that has rattled economies across the globe.

Following were the challenges:

- Supply chain & Logistics
- Manpower availability and movement
- Despite poultry being classified as an essential goods item, our biggest challenge, at Nandu's, has been coping with the prevailing uncertainty. The earliest manifestation was in disruptions in the logistics and supply chain. Manpower management was another challenge, as many members of our staff were anxious and were considering going back to the presumed safety of their towns/villages.

- As I look back at the last few months, I recognise that we were able to overcome these challenges essentially due to our robust foundation and agile work culture. Nandu's has fully integrated back-end operations, wherein we own our own hatcheries, feed mills, breeding farms, processing centre, food factory, cold chain infrastructure and retail stores. This is a huge advantage that enables us to make swift changes, ensuring that we can offer uninterrupted services to our customers.
- However, without the resolute support of our staff and our integrated farmers it would not have been possible to overcome the challenges. A strong sense of community has helped us emerge stronger. We have been proactive in providing a safe work environment, accommodation and easy access to daily essentials to all our staff members as well as ensuring livelihood, safety and business continuity for the farmers.

Chapter-2

Integrating Livestock Farmers with Market in India

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Introduction:

In India, the emphasis of the extension machinery in the animal husbandry sector has been historically on increasing the production through technology transfer, input supply and health care. Unless we move our focus from increasing the production to enhancing the income of the farmers, they will lose faith in our extension system. We need to provide them market related information such as price and demand for the products which we advise the farmers to produce.

That's why; this topic assumes significance these days. Our Hon'ble Prime Minister also gave a clarion call to double the farmers' income by 2022 in his Independence Day address in 2015. This may not be possible, unless we know how the livestock products move in their supply chains in India.

Crop Vs Livestock Sector

Agricultural sector as a whole contributes about 14% in the country's GDP, of which the contribution from livestock sector is around 29%. But, it receives lesser attention in terms of allocation of funds from Centre. Ownership of the livestock is evenly distributed with landless labourers & marginal farmers. Hence, the progress in this sector will result more balanced development of rural economy.

The majority of the world's estimated 1.3 billion poor people live in developing countries where they depend directly or indirectly on livestock for their livelihoods (World Bank, 2008 and FAO, 2009). Globally, livestock contributes about 40 percent to the AgGDP and constitutes about 30 percent in the developing world (World Bank, 2009).

Livestock & Poultry Population

India owns one of the largest livestock populations in the world (2019). It possesses 56.7% of world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4%equine, 1.5% pigs and 3.1% poultry.

Total Value of Output: Rs 10, 43,656 crore (at current prices) during 2017-18 ~28.4% in total Agricultural output. The contribution of milk alone was higher than paddy, wheat and sugarcane.

- Cattle - II- in the world - 192.49M
- Buffalo - I- in the World - 109.85 M
- Sheep - III- in the world - 74.26M
- Goat - II- in the world - 148.88 M
- Pig - IX-in the world - 9.06 M

Among the total cattle population in 2019, about 75% of them are female cattle, comprising 51% indigenous/ ND and 24% exotic/ crossbred. In case of total buffalo population in 2019, about 92% are female of which 75% of animals are in in-milk condition. It is understandable that buffaloes are the major source of contribution to the total milk production.

Changing Livestock Production Systems

Livestock systems are changing rapidly, due to a number of factors, viz.

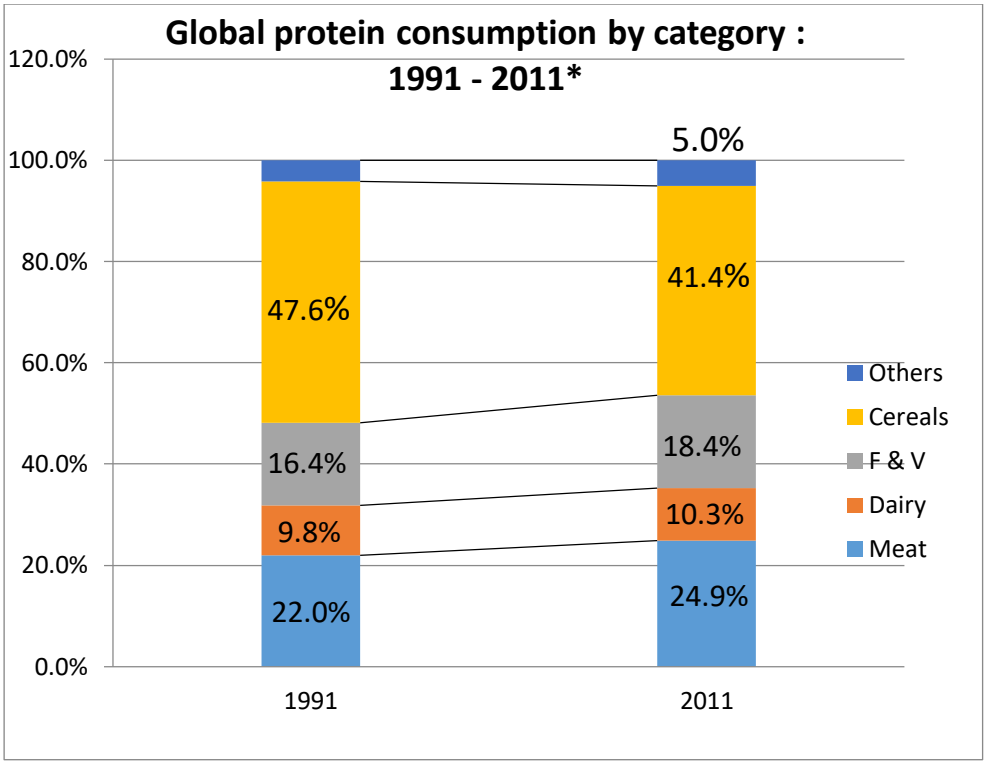
- demographics (population growth and urbanization),
- general economic development,
- Better technologies and knowledge.

There are two broad livestock production and marketing systems:

- Smallholder production systems
- Large, organised production systems

Demand for livestock products on the rise

It is observed from a study conducted by PwC using FAOSTAT; it is observed that the share of protein from different food sources in the 20-years period from 1991 to 2011 indicates a shift towards animal source, namely dairy products and meat. This is indicative of more demand for livestock products by the population.

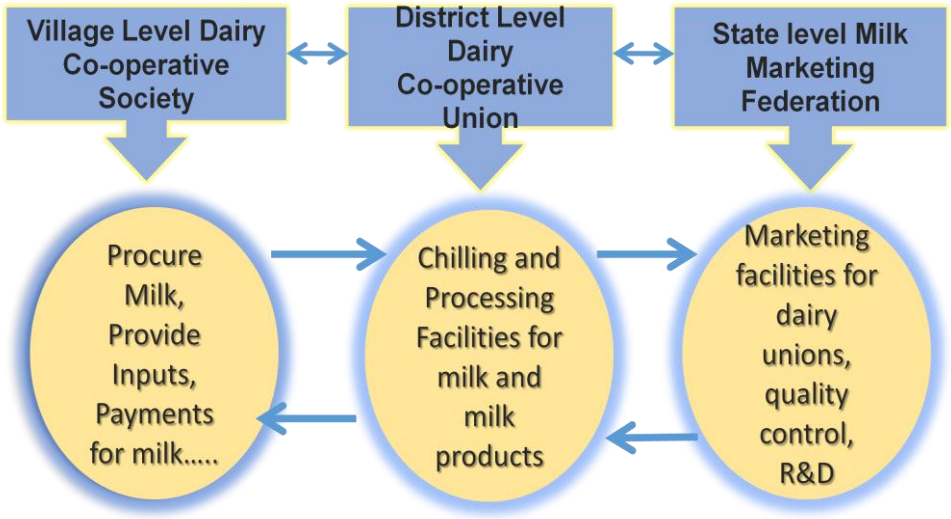


For example, the contribution from meat has grown by 2.9%, dairy by 0.5%, while that from cereals decreased by 6.2% in the diet consumed by the population.

Successful Experiences in Linking Livestock Farmers to Market

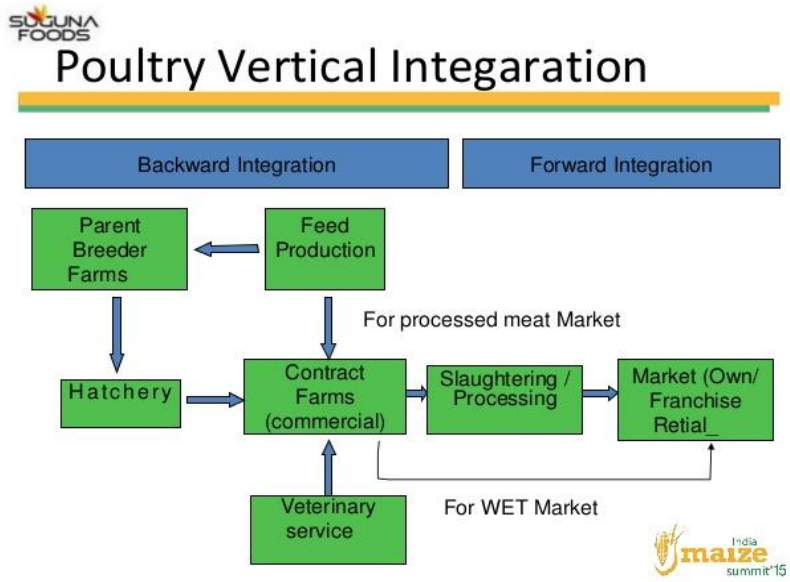
Dairy

With respect to dairy sector, the AMUL model became so successful in connecting the smallholder dairy farmers to market through cooperative system in almost one third of our country.



Poultry

The major input companies in the commercial layer and broiler farming have connected the poultry farmers of all sizes to the market through contract farming system in our country. This sector has become a significant industry over a relatively shorter time in about one third of the country.



Concern

Excluding the above-mentioned sectors, the major concerns still remain as follows:

- Most of the livestock farmers are smallholders.
  - Hence, their marketed surplus in smaller.
- They are away from the market.

  Hence, there is information asymmetry existing between them and market intermediaries.
- They are poorly organized.

  Hence, their bargaining power is weaker.

  Besides these, dairy sector is still dominated by smallholders.

Small ruminant sector is a neglected one. Goat was blamed for desertification (NCA, 1975). Sheep originally reared for wool lost prominence, since wool was permitted to be imported under OGL. Their population also stagnated during the period from 2007 to 2012. Goat population declined by 4% and sheep declined by 9%. The major limiting factors continued to be lack of pastures and fodder shrubs and absence of farmers' group / organisations in linking them to markets, besides availing inputs and veterinary services.

Backyard poultry farming has been mainly undertaken by the rural population for household food and nutritional security, rather than for commercial purpose. This is mainly because of their distance from the market and a small marketable surplus.

Pig farming is very important component in North East India. Out of total pig population in India, 28% are grown in this region. Some other pockets of India, viz. Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Bihar and Goa also promote and practice pig farming. Producers in this area are linked to markets in the conventional form of "Producer-Commission Agent-Seller-Consumer" channel.

Strategies to Link Livestock Farmers to Market

- Creating market infrastructure
  - Animal markets, Slaughter houses
- Organizing the farmers
  - FPOs, FPCs, Cooperatives, Contract
- Empowering them with market related information and skills
  - Media, Portals, Exposure to successful systems

Recommendation of the Committee on Doubling Farmers' Income (DFI)

In order to have efficient livestock marketing in our countries, the Committee on DFI recommends the following:

- Proper facilities to be created at live animal markets.
- Tagging of animals to be done at live markets to ensure traceability.
- Transport of live animals from their breeding grounds to markets and processors to be facilitated.
- Prices of live animals based on certain parameters need to be standardised to streamline the market transactions
  - age, body weight and structure, appearance, breed, yield and health status

Recent Initiative

- Ministry of Fisheries, Animal Husbandry & Dairying, GoI has launched a web-portal, epashuhaat.gov.in in 2016.

  - It provides real time access to relevant information on germplasm and live animals.
  - It helps connect breeders, state agencies and farmer stakeholders.
  - It is the first step in unifying and harmonising the livestock market.

- To fully facilitate livestock transactions, the next steps require the organising and modernizing of the existing livestock market places.

Chapter- 3

Opportunities in Silage and Hay Making

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Introduction

The primary source of income for the majority of Indians (about 70%) who reside in villages is agriculture and livestock. Around 80% of all livestock in the nation is kept by marginal (those with less than 1 hectare of land) and small farmers (those with less than 2 hectares of land). Livestock farming, particularly dairy farming is now the main source of income for these farming communities. All dairy farms need feed as a substantial and consistent input, and it represents between 70 and 75 percent of the overall cost of producing milk (Kilic and Abdi, 2016). In commercial dairy production, ensuring the supply of green fodder throughout the year is challenging due to the high cost of fodder and feed for the livestock. However, it is preferable that excess green herbage be maintained or conserved with the least amount of nutritional loss for supply during lean periods when fresh forage is scarce or nonexistent.

Green fodder, wheat straw, and concentrate make up the majority of the diet of dairy animals. To serve the needs of high-yielding animals, concentrate is a feed that is high in protein and energy for dairy animals. Wheat straw acts as filler and provides bulk by virtue of its fibre content, which also satisfies animal appetites. The natural, vital, and cost-effective source of nutrition for dairy animals is green fodder. Characteristics like being a natural feed, being laxative in nature, maintaining rumen motility, helping in absorption through the rumen wall (the scratch factor), providing bulkiness, stimulating rumination and saliva production, being a cheap source of nutrients, and helping maintain milk fat percentage make the fodder an essential component of the ruminant diet.

Farmers rely on harvested or purchased green fodder, crop residue, gathered grass, pastureland, and grazing on common property to fulfil their green fodder needs. Contrary to the recommended 10%

area, fodder is being grown on just around 5% of the gross cropped area (Roy et al., 2019). The most widely grown fodder crops in the country include sorghum, berseem, maize, bajra, fodder cowpea, and oats. The availability of grazing land and other pastures is dwindling. Typically, adult cattle weighing 400 kg need 32–40 kg of green fodder, which is determined by taking 8–10% of the animal's body weight into account. India has deficits in green fodder, dry fodder, and concentrate by 11.24 percent, 23.44 percent, and 24.78%, respectively (Roy et al., 2019). The burgeoning livestock population coupled with a non-focused approach to fodder cultivation will further widen the supply-demand hiatus in the future. Further, the deficit gap is not uniform in the country; some areas are hugely deficient compared to others due to topography, cultivation practices, soil quality, rainfall, etc. This disparity further widened during the lean periods. Due to the increased prices paid for animal feed in the lean period, farmers are forced to keep their animals alive by feeding them poor-quality straws or a meagre quantity of purchased fodder or concentrate.

Fodder conservation through silage and hay making is now gaining grass-roots acceptance due to easy feeding, sustained or enhanced milk production, and long shelf life. Everyday labor-dependent chores like cutting and bringing green fodder from the field and chopping are no longer required, and it also helps to overcome the regional disparity in fodder availability. Many comapnies/entrepreneurs had already venture into this sector as presently this sector is growing more than 8% CAGR. Conservation of fodder pertains to the preservation and deliberate management of certain quantities of fodder that remain intact via chemical reactions or physical transformations of fodder, when there is an abundance of feed accessible for future demands. In both kharif and Rabi seasons, excess green herbage can be preserved or conserved with the least amount of nutritional loss possible as silage, hay, or artificial dehydration. The Government of India is also boosting this business by providing subsidy benefits to the person venturing into this end-to-end mechanised silage preparation under the National Livestock Mission.

Silage is a material produced by deliberately regulating the anaerobic fermentation of crops. Ensilage is the term for this process, while a silo is the pit/container/structure used for it. Fresh herbage bacteria or chemicals that preserve anaerobic conditions control the fermentation process. Natural bacteria ferment the carbohydrates (sugar) in the herbage when it is stored in an airtight pit/container, mostly generating lactic acid. The goal is to reach a lactic acid concentration high enough to stop clostridia activity and other types of bacterial activity.

Advantages of silage making

- Silage fermentation minimizes anti nutritional factors that build up in plants during droughts and in overfertilized crops. Nitrates decreased by around 23% in G. Grass and oxalates by about 62% in Bajra, oxalates by 54% in N. Bajra, and prussic acid by 100% in Punjab Sudex charri-1 crops.
- Succulent feed is made available throughout the year,
- It retains majority of feed energy
- It is a delicious laxative feed
- Silage is less susceptible to weather hazards than haymaking
- Least amount of nutritional loss when compared to other preservation techniques
- As the fodder is gathered from the field when it is in bloom, it contributes in weed control
- It aids in overcoming the lack of green fodder
- Ten times less space is needed to store silage than hay
- The inclusion of raw organic waste like poultry excreta is possible through silage

Characteristics of good silage: -

- ❖ pH range - 3.5-4.2.
- ❖ Lactic acid content above 3%
- ❖ Butyric acid less than 0.2%
- ❖ Ammoniacal nitrogen less than 10% of the total nitrogen.
- ❖ Color should be bright and light green.
- ❖ Smell should be pleased or little bit vinegar type

Principle of silage making

• Anaerobic condition is first and foremost requirement for silage making, as it allows lactic acid bacteria to grow, which converts sugars into lactic acid, a strong organic acid

• As pH declines, the degrading actions of plant enzymes and undesirable bacteria are inhibited and at pH 3-4, most degrading enzymes are inhibited and the growth of lactic acid bacteria is also inhibited

Sugars + Oxygen → **Carbon dioxide + Water + Heat**

Preparation of silage:

Silo is required to make silage. A silo is an airtight structure intended for the storage and preservation of high moisture crops. It can also be a hole or pit in the ground, a trench or tower above the ground where green fodder is stored.

Types of silo:

Pit, tower, trench or bags/bales can be used to make the silage depending upon number of animals, length of scarcity period, kind of soil and drainage and depth of water table and rainfall and other weather conditions. Around 5-6 quintals chopped fodder can be filled in one cubic meter silo pit. Generally width of silo pit is around 2 meter, depth is 2 meter and Length of pit can be adjusted as per the quantity of fodder to be ensiled.

Balage

Balage is another name for bales of silage. Silage can be produced using a silage baler machine as a bale or a seamless bag. Depending on its capacity, a silage baler machine can produce bales with capacities ranging from 50 to 1000 kg. These bales typically measure 4 feet wide and 5 feet in diameter. Now days, balage making is end to end mechanized. Machines like cutter, chopper, loader, baler etc are required for making balage aside from tractors and trollies for transport.

It is an efficient method for feeding preservation with little nutrient loss. These bales can be stored wherever farmers need them. In the bag or tube, the silage is entirely sealed. It also has the advantage that, unlike pit silage, where the acid seeps out, all of the acid is retained in the silage. No issue with rotting after opening since single bales has to be opened when used.

Crop selection for silage production

- Forages with a high quantity of fermentable sugar, low protein content, minimal buffering power are convenient to ensile
- At the time of ensiling, the dry matter percentage should be around 35%
- Silage is typically made from crops with high carbohydrate levels.
- The nutritional value of the silage is significantly influenced by the time of harvest. Due to the lignification of the stem, early harvesting lowers the dry matter content whereas late harvesting lowers digestibility.
- Maize, Jowar, Oat, and Bajra are the crops that are utilized most frequently
- Pasture grasses, such as Sudangrass, Setaria, and Elephant grass (Napiergrass), Stylo (pasture legumes), wheat, rice, soybean, and peanut hulls etc. are also used for silage making

S.NO	Fodder crop	Stage of harvest
1	Maize	Dough stage
2	Charri/sorghum	From ear formation to grain formation
3	Bajra	At the time of ear formation
4	N. Bajra	At the height of 1 meter
5	Oat	50% flowering stage
6	Rye grass	First harvesting at 45-50 days and next after 25-30 days

Estimation of moisture content of forages

To determine the forages' moisture content before adding them to the silo, a variety of techniques are frequently used. A grab test can be used to estimate the moisture content of chopped silage. Forage that has been cut up can have its moisture content estimated using the hand or squeeze method. Minimizing nutrient losses during silage is mostly dependent on the fodder having the ideal amount of dry matter. Silage with a high moisture content loses more effluent. The main drawback of high moisture silage is that it encourages clostridial fermentation, which results in large losses of dry matter, high levels of butyric acid, and reduced nutritional intake. High moisture (> 75%), which also encourages clostridial proteolysis and causes loss of crude protein content.

Grab test or Fist method to determine DM content of the silage	
Forage or silage squeezed in hand	**Moisture (%)**
Water easily squeezed out and material holds shape	More than 80
Water can just be squeezed out and material holds shape	75-80
Little or no water can be squeezed out but material holds shape	70-75
No water can be squeezed out and material	60-70

falls apart slowly	
No water can be squeezed out and material falls apart rapidly	Less than 60

Composition and Process of Silage Making: -

General Considerations:

- Silo pit must be at higher altitude/elevation
- It should be away from milking parlor to prevent its flavor creeping into milk
- The crop chosen must have high carbohydrate contents
- Crop must be chopped (5-8 cm) to increase the surface area
- Once silo is opened a 4-6 inches layer must be removed daily as the top layer gets spoiled

Filling of silo: -

- The bottom of silo must be free from moisture and usually should be above the water table
- It is better to spread a layer of hay or straw at the base
- Chaffed fodder should be evenly spread throughout the silo
- The filling of silo must be completed rapidly in the shortest period of time
- While filling silo, the ensiling mass must be pressed by mechanical means so as to expel maximum air out of silo
- The walls of silo should be strong enough to withstand pressure of gases and there should be no entrance of fresh air
- Raise the level of ensiled mass little above the ground which would get reduced in the due course of time.
- Cover the silo with a layer of plastic sheet, plaster it with mud to make it air proof. Several materials can be utilized to cover the filled silos and make it airtight. With the exception of tower silos, all other types including heap-ditch, bank, silos with adjustable walls, vacuum type silos, plastic sausage silos, and large/small bales require covering material. Polyethylene films have been extensively used in greenhouse construction, silage baling, and to cover bench-style silos. The silos should be covered with a PVC or polyethylene-based plastic material that is 0.15-0.30 mm thick.

Process of silage making: The process of silage formation can be divided into two types of changes

Chemical changes-

- Living cells of chaffed fodder continue respiration and use all the oxygen entrapped in silo. This helps in creating anaerobic condition within five hours.
- CO_2 gas occupies 70-80% of the total gas present in the silo.
- There is rise in temperature up to 38°C of ensiled mass due to oxidation of fermentable carbohydrate.
- Fermentable carbohydrates of ensiled mass are targeted by plant enzymes and enzymes of trapped microbes causing production of acids, which in turn lower the pH to 3.5 or 4 in a good silage.
- Due to breakdown of sugars and subsequent production of various organic acids. Lactic acid is the chief acid produced upto 85% of the total acid content in silage. Other products of fermentation of sugars are volatile fatty acids i.e. acetic acid, butyric acid, ethanol, gases, water etc.
- There is loss of dry matter due to fermentation upto the extent of 20%.
- Magnesium free derivative of chlorophyll is formed which is responsible for change in color of silage.
- If air finds entrance the temperature raises quickly due to oxidation, it causes loss of considerable amount of carotene.

2. Microbial changes:

- A large number and a variety of microflora are trapped along with ensiled mass which start attacking on cell content of fodder.
- Lactic acid bacterial counts are reaching a peak on 7th day after which there is a gradual decrease. This is due to sudden death of anaerobic bacteria because they do not survive under anaerobic condition.
- Initially higher counts of coliform bacteria in observed because of available oxygen in the trapped air. These bacteria produce lactic acid, acetic acid etc. the presence and the number of these bacteria and production of volatile organic acid like acetic acid and butyric acid would largely depend upon the amount of oxygen available, quality and quantity of fermentable carbohydrate etc.
- Acidity produced due to lactic acid production inhibits the fermentation process at pH 4, which is necessary for preserving the silage.

- This lower pH-4 also checks the growth of clostridia which grow best at pH at 7.0-7.4. Clostridia can utilize sugars and lactic acid and produce butyric acid, similarly they can act on protein and produce acetic acid, amines and ammonia. These are toxic for animal and produce unpalatable silage.
- If proper anaerobic condition is controlled, then no fungal growth is observed. Even fungal floras present in the feed are destroyed during anaerobic condition. If anaerobic condition is not maintained these fungi grow and produce a toxic substance rendering silage unpalatable.

Approaches for regulating fermentation

There are a number of approaches to monitor clostridial type fermentation.

Optimum dry matter content:

Increasing the dry matter of the fodder is one of the often-practiced methods. Crops that have been ensiled and have at least 30% dry matter ensile satisfactorily. An important mechanism for regulating clostridial development is the promotion of lactic acid fermentation. The addition of stabilizers and chemicals is another approach of regulating fermentation. The forages may contain naturally occurring carbohydrates or they may be added as a separate ingredient, such as molasses, which serves as a fermentable substrate and is a by product of the sugar industry.

Activity of microbes: The species of Escherichia, Bacillus, Clostridium, Leuconostoc, Lactobacillus, and Pediococcus flourish in silos when anaerobic conditions are attained there. Streptococcus, Leuconostoc, Lactobacillus, and Pediococcus are key lactic acid bacteria for the preservation of high-quality silage.

Silage additives*:* Several additives like lactic acid producing bacteria, spores, propionic acid, formaldehyde, sulphuric acid, enzymes, microbes' inoculants, molasses, whey, yeast, and other substances high in energy etc are used to boost the favourable conditions in the silo.

Quality of silage:

The quality of silage can be judged by its color, smell, taste and touch.

Parameters	Characteristics
Color	In general, pale yellow indicates good quality. If the color is from dark brown to dark green, the silage underwent bad fermentation and is of bad quality
Smell	Acidic or a sweet-sour pleasant smell indicates good quality. On the other hand, if there is a manure smell or putrid smell and it is so repugnant that one cannot put the silage near one's nose, the quality is poor. Alcohol, sharp sweet, rancid or tobacco smell indicate high ethanol, propionic acid, butyric acid and excessive heating of silage respectively.
Taste	If the silage tastes sour and there is no problem in putting it in one's mouth, the quality is good. On the other hand, if the silage tastes bitter and one cannot put it in one's mouth, the quality is poor
Touch	When squeezing the silage tightly in a hand and then opening the hand, if the silage breaks slowly into two, that silage is of good quality. If the silage breaks into small pieces separately, the silage is deficient in moisture content. If water is dripping, the moisture content of the silage is too high

Hay Making

Hay making is the process of drying high-quality forages (especially leguminous) to preserve them. The purpose of making hay is to retain the nutritional value of forages by drying them to a point when microbial decomposers' activity is inhibited. India has an abundance of sunlight, which helps farmers to dry the green forage in the open air and so increase the cost-effectiveness of hay. The process of making hay results in a moisture content reduction of 10–15%, which hinders the plant's ability to conserve its enzyme activity. All cultivated legume fodders, including berseem, lucerne, and cowpea, as well as thin-stemmed cereal crops like sorghum, oat, guinea grass, and range grasses are appropriate for making hay.

For Indian farmers, making hay is comparatively more convenient and simpler. Sun drying is one option. Hay can be made by either naturally drying in the shade or artificially drying with solar energy during bad weather. To avoid any type of fermentation or bacterial growth, harvested forage

should be chopped and spread over the ground for sun drying. Chopping of fodder leades to less loss of leaves. The layers should be replaced every day.

Crop selection for hay making:

The fodder crops with supple and flexible stems are better suited for making hay. Hay can be made from green berseem, lucerne, cowpea, and other plants. It is advantageous to crush the stem or slice the actual fodder when making hay from crops with thick stems. After 60 days, berseem/lucerne should be collected initially, and then after 25 to 30 days, crop should be harvested again to have optimal nutritional value.

Kinds of hay:

*Leguminous hay***:** Good legume hay has various qualities that make it particularly valuable to dairy animals. It contains a higher proportion of nutrients that are easily absorbed. Because of the high protein concentration, it contains more digestible proteins. Furthermore, compared to proteins from other plants, the proteins found in legumes are of higher quality. Legume hays that have been properly cured have increased vitamin levels. They may even include vitamin D and are particularly high in carotene. Additionally, they contain a lot of vitamin E. The calcium content of legume hays is especially high, and they are often tasty. e.g. Cowpea, berseem, Lucerne, soybean

Non-legume hay:

Grass-based non-legume hay is inferior to hay made from legumes. They often have lower protein, mineral, and vitamin contents than legume hays and are less appetizing. Due to their higher output per hectare and ease of cultivation, non-legume hays have an advantage over legume hays. e.g. Barley, Oat, Bajra, Napier grass.

Mixed hay:

This type of hay has been prepared from a blend of non-legume and legume crops. The proportion of the various species cultivated as a mixed crop will determine the composition of this type of hay. e.g. Pea +Oat, Oat + Lucerne and Barley + Lucerne.

Prerequisites for high-quality hay

- Leafy hay is a sign of good hay. It has been observed that leaves have a higher nutritional value than other plant parts. The leaves are a good source of minerals, vitamins, and proteins. The final product's feeding value would decline if leaves were lost throughout the hay-making process

- It needs to be green in color. The amount of carotene, a precursor to vitamin A, is indicated by how green the leaves are
- It should not contain weeds or leftover crop debris
- It should not contain dust or mould
- It should have the distinct aroma of the crop
- The amount of moisture in hay shouldn't be higher than 15%
- Hay of average quality typically contains 25–30% crude fiber and 45–60% TDN

Method of hay making

Cutting and slicing berseem or leucerne in the prebloom or bud stage, then spreading it in a thin layer of 4-5" inches on a smooth, clean surface is a very easy method for making hay without losing any leaves. The forages that were drying were periodically stirred. The final step involved bringing the chopped stem and leaves together. Second, allow the crop to wilt completely by leaving it on the field for a few hours. It needs to be raked into windrows, which are small, loose piles. If the weather is favourable, the hay is only dried in windrows. It must be wise to partially turn over the windrows after a few hours in order to speed up the process when the hay cures slowly due to the weather. If hay is wet from rain while in windrows, turning may also be required. If the moisture level drops to 20% at this point, hay can be baled. Tripod stands can be employed in areas with significant rainfall. This approach has the benefit that if it rains, the water will drain and there will be adequate oxygenation from below. India has experimented with a number of forages drying techniques, including drying the crops on rooftops, fences, wires, and galvanized tin sheets. Care should be taken in each of these situations to prevent leaf cracking.

Barn drying:

This approach is appropriate when bad weather prevents hay crops from being dried by the sun. Crops are first partially dried in an open field until their moisture content falls below 30%, after which they are laid out on the floor of a barn in tiny furrows through which heated air is artificially circulated to speed up drying. Although this process is costlier, the vitamin A content of the hay produced using it is significantly higher. Chopped hay can be stored in any area typically used for wheat bhoosa.

Factors influencing the quality of hay

The following factors that determine hay quality are significant and need to be considered:

- Plant type

- Harvesting stage
- Leaf-to-stem ratio
- Chemical composition
- Physical form
- Deterioration during storage

Commercial hay making is still at infancy stage in the country as compared to developed countries. In the later; hay making is also end to end mechanized using machines for cutting, tedding, raking and bailing. Being easy to make and comparatively less investment is required, hay making has tremendous potential in the country.

References:

Kilic U. and Mohamoud Abdi A. 2016. Determination of in vitro true digestibilities and relative feed values of wine industry grape residues as alternative feed source. *Journal of The Faculty of Veterinary Medicine*, Kafkas University, 22 (6): 895-901, DOI: 10.9775/kvfd.2016.15617

Roy A. K., Agrawal R. K., Bhardwaj N. R., Mishra A. K. and Mahanta S. K. 2019. Revisiting national forage demand and availability scenario. In: *Indian Fodder Scenario: Redefining State Wise Status*, ICAR- AICRP on Forage Crops and Utilization, Jhansi, India, pp. 1-21.

Chapter-4

Case Studies of Farmer Producer Organizations (FPO's) in Livestock Sector

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1. Savitri Bai Phule Goat Farming Producer Company Ltd.

This Company is located at Dodi Bk, Taluka Sinnar, and District Nashik. Company's operational area contains 30 villages of Sinnar Block.

Background

Sinnar is located around 30 Km west of Nashi, a drought prone area, wherein out of 129 villages in Sinnar Taluka, 43 villages get water supply through tankers in summer season. The drought conditions posed a challenge to the development organizations of Sinnar to transform the scenario. This socio economic scenario made Yuva Mithra with target group of women who are either widow or single, the most vulnerable sections of the society were chosen as a stakeholder for creating sustainable livelihood opportunities for them.

Goat farming and Poultry farming are suitable for women which are being undertaken by the families in these villages. Though the village ecosystem supports these two livelihood options, they were not being commercially practiced due to non-existence of certain basic infrastructure facilities.

To look into this matter, SavitriBai Phule goat Producer Company was established to improve goat rearing practices among women and enhance their income by targeting on livelihood opportunities.

Objectives of FPC

- To enable the determined target group of people to undertake goat farming business through adequate knowledge dissemination and developing market linkages.
- Awareness and intervention of affordable technology in got farming.
- Strengthening farmers' capacity through best goat rearing practices and its productivity.
- Providing modern goat farming techniques.
- Providing fair market linkages and also branding of by products like milk and milk products, manure, meat, skin products etc.

Activities of FPC

- Establishment of goat farm (shed) in company area.
- Increasing live weight base marketing.

- Providing women with the transportation and other facilities like marketing, veterinary service, fodder etc.
- Company has set meat shop and mini slaughterhouse.
- Selling of milk and goat skin.
- Setting of manure compost plant.

Project Impact

The Project has successfully created both qualitative and quantitative impact in the lives of 460 women

Qualitative Impact: the qualitative impact is as follows

- Inculcating improved techniques of goat farming
- Introducing Sangamneri buck in this area to improve breed quality in goats
- Installed fodder demonstrations, silage demonstrations and compost goat manure demonstrations in every village for food security.
- Increased women's role especially deprived ones in decision making process at family and society level
- Celebrated a special event on International Women's Day with the project beneficiaries. The event honored hard working women who have empowered themselves to be self -dependent. These also encouraged other project beneficiaries and are inspired by them.

Quantitative Change: the quatitative impact is as follows

- Established 82 Modern Goat Sheds (43 sheds through revolving funds)
- Conducted 5 vaccination camps for 1465 goats resulting in reduces rate of mortality from 14 per cent to 4 per cent.
- Increased the goat herd size from 2 to 9.
- Provided insurance services to 853 goats through New India Assurance Company Ltd.
- Started Weight based marketing
- Average household income has increased by 15 per cent

2. Paayas Milk Producer Company

Paayas Milk Producer Company Limited was incorporated on 19th May 2012 under Part IX A of the Companies Act 1956 with a paid up share capital of Rs. 9 crore during 2013-14 which increased to Rs.31 crore during 2016-17. The company has successfully allotted membership to 1, 12,460 milk producers of Rajasthan by 2016-17 from 37,824 in 2013-14.

Mission

Paayas Milk Producer Company at Jaipur is committed to increase the income of their members by reducing the cost of milk production and enhancing their milk business.

Vision

Being committed to its mission, Paayas Milk Producer Company shall become one of the pioneer companies among world dairy enterprise and will prove to be first choice of its members, customers and employees

Values: Paayas Milk Producer Company is committed to the values like

- Honesty and transparency
- Team spirit
- Quality and excellence at every level
- Long term vision
- Innovation
- Passion

Membership Eligibility

Categorization of Members of Paayas

Sl.No	Parameter	Class – A	Class – B	Class – C
1.	No. of days of milk supplied to the company in a year	270 days or more	270 days or more	200 days or more
2.	Annual Milk Quantity supplied to the company (in Litres)	6000 or more	2000 or more but less than 6000	500 or more but less than 2000
3.	Minimum number of shares subscribed (amount of share capital contributed)	60 shares (Rs.6000/-)	20 shares (Rs.2000/-)	5 shares (Rs.500/-)
4.	Ratio of milk quantity applied during winest months (November to February) to that of Summer Months (April to July) during a financial year	Winter to Summer ration shall not exceed 3.0	Winter to Summer ration shall not exceed 3.0	Winter to Summer ration shall not exceed 3.0

Diary Value Chain

The major interventions of the Company are as follows.

- ✓ Organized Awareness Programmes for milk producers to educate them about the company and its various activities
- ✓ Ensured automation of Milk Pooling Point / Milk Chilling Centres with encrypted calibration
- ✓ Revamped Supply Chain to make it more quality oriented and cost effective
- ✓ Built additional processing capacity to accommodate increased milk Volume

- ✓ Developed more strict acceptance norms by introducing additional milk quality checks
- ✓ Expanded market network to perk-up sale of milk and milk products.

Ensuring Quality

Automatic Milk Collection Units are installed at all Milk Chilling Centers. There is a battery of analytical tests through which milk has essentially to pass before it is cleared for further processing. Extensive members' education is being imparted at village level in clean milk production domain. Similarly, a strict quality assurance protocol remains in place during processing and packing of milk and milk products. In addition, the Company sends Milk sample to independent laboratories for its analysis. Because of its rich taste and pleasant flavour, Paayas Milk Products find favour from the buyers.

Milk Procurement

The Company is currently operating in 8 districts of Rajasthan as depicted below. Area marked in green represents the districts taken up under National Dairy Plan (NDP). The same in blue denotes Non NDP districts. As overwhelming support from the producers enabled the Company add new milk pooling points to its Procurement Network. The MPP increased from 1,361 in March, 2014 to 2,315 in March 2015 registering an annual growth of 70 percent. Milk procurement augmented from an average of 339 TKPD in 2013-14 to 412 TKPD in 2014-15 posting a growth of 22 percent. The ratio of milk procurement between April - September and October – March remained 1:1.68.

Producer Institutional Building

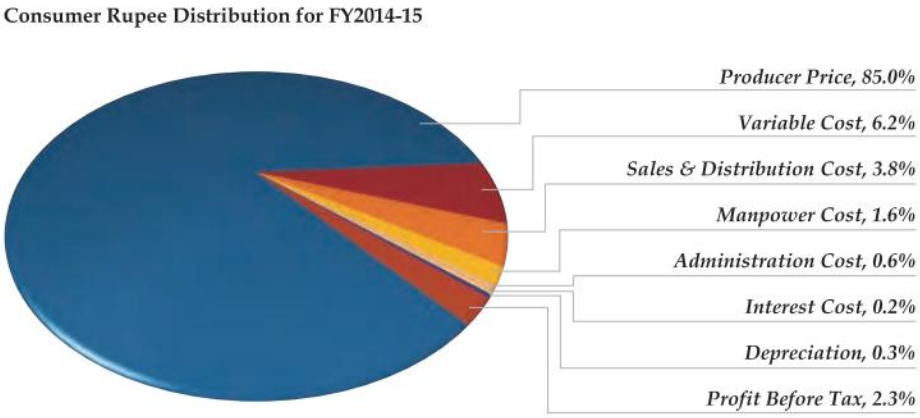
A responsible member is the backbone of the company. Producer Institutional Building interventions therefore are vital. The major PIB interventions remained as follows :

- Producer Awareness Programmes
- Women Awareness Programmes
- Rural Youth Awareness Programmes
- Clean Milk Production Programme
- Children Awareness Programme

Capacity building programs: the FPC organizes various capacity buiding programs like

- Producer-member orientation programmes
- Orientation programmes for VCG and MRG
- Training for the Board of Directors

Consumer Rupee Distribution for FY 2014-15: it can be noticed that, of the total price paid by the consumer, highest share of 85 per cent was received by the producer. This indicates the complete absence of middlemen and thus no exploitation of the producers.



Key Financial Indicators: the total revenue of the producer company has recorded a growth of 58.19 per cent i.e from Rs.444 crore during 2013-14 to Rs. 1062 crore in 2016- 17. While, the total milk payments made by the company during the same period was Rs.375 crore and Rs.843 crore. The profit before tax and profit after tax was Rs.17 crore and Rs.11 crore respectively during 2016-17 as against Rs.3 crore and Rs.2 crore respectively during 2013-14. The dividends per share were found to be decreased from Rs. 10 during 2013-14 to Rs. 8 during 2016-17.

Best Farm Practices to Combat Covid-19

1. **Poultry chicks at door steps and Online Training by KVK Ernakulam of ICAR-CMFRI, Kerala**

- Online delivery of poultry chicks were advertised in Newspapers and All India Radio
- Received 299 calls and 177 messages during 8th to 15th April 2020 and bookings for units comprising 4 female and 1 male birds and payment received by cash. They have supplied chicks to 1308 numbers worth 3.20 lakhs at door steps during lockdown. Also conducted online class on through Facebook live

2. **Fish seeds and feed delivered at farm gate and Online Training by KVK Ernakulam of ICAR-CMFRI, Kerala**

- Fish seeds and feed were delivered from KVK's Satellite seed production units.
- Farmers registered in KVK WhatsApp and repeated announcements were made through All India Radio
- Online class on 15th April 2020 Facebook live
- Delivered 15,000 seeds and 200 kg feed worth 1.72 lakhs during the lock down period to 46 farmers.
- Payment received online to KVK account at SBI, Perumpilly, Narakkal Branch.

3. **Fresh fish door delivery during lockdown by KVK Ernakulam of ICAR-CMFRI, Kerala**

- KVK's SHG that was registered in 2018 for fresh fish supply was arranged to collect fish at farm gate, clean and supply to the consumer homes by using their vehicle.
- Fish door delivery mechanism commenced on 27th March by using WhasApp group broadcast as communication tool and advertisement via radio announcement/newspaper.
- Farmers were paid instantly at their farms by cash at mutually agreed price.
- Average daily supply was 510 kg worth 1.6 lakhs from 11 farmers catering to 350 homes daily.

3. Baani Milk Producer Company

Baani Milk Producer Company is Punjab's largest integrated milk producer company operational zed on 6th November 2014 and has its Head Office at Patiala, Punjab. It is fully owned by Punjab's dairy farmers, who work hard to ensure that you get only the fresh and pure milk and milk products. Baani Milk constantly endeavors to transform lives, by educating dairy farmers on smarter methods of milk production and fair practices. About 31,000 members contributed a share capital of Rs. 4.3 crores in the company as of 31st March 2016. With a turnover of Rs. 202 crores, Baani MPC on an average procured about 1.6 lakh Kg of milk per day. Baani MPC makes bulk supplies to institutions. Baani has launched cattle feed and area specific mineral mixture for its producer-members. Beyond the production of pure and hygienic milk and milk products, Baani Milk is dedicated in promoting a self-reliant dairy community. Baani Milk enables proud farmers to grow in this highly competitive dairy industry. Come be a part of the Baani family, and support the livelihood of more than 55,000 farmers.

Mission

Baani Milk Producer Company is committed to increase income of its members by increasing milk production, reducing milk production cost and by offering competitive price and necessary services.

Vision 2030

Baani Milk Producer Company will be among top five dairy companies in India and be the first choice of milk producers, customers and its employees.

4. Shreeja Mahila Milk Producer Company Limited (Shreeja MMPCL)

Shreeja MMPCL is the world's largest only women owned milk Producer Company, with Head Office in Tirupati, Andhra Pradesh had started functioning from 15th September 2014 and has been formed with an objective of maximizing returns to its members through professional management and by harnessing capital, markets and technology thus ensuring business growth without undermining the basic Cooperative principles of democratic governance and autonomy.

Main objective: to carry on the business of procuring, pooling, processing and marketing of milk to create maximum value for its shareholders and at the same time provide the best quality milk and milk products to the customers.

Membership: About 56,000 women members contributed a share capital of Rs. 4.3 crores in the company as of 31st March 2016. With a turnover of Rs. 284 crores, Shreeja MMPC on an average procured about 2.7 lakh Kg of milk per day.

Area of operations: Operates in the districts of Andhra Pradesh and bordering villages of Karnataka and Tamil Nadu, covering about 1300+ Revenue Villages with a membership of about 74,000+ through 3,000+ Milk Pooling Points with an aim to reach milk procurement of about 4.22 lakh Kg Per Day in FY 2019-20.

They are also providing balanced compound cattle feed and mineral mixture in the brand name to its producer members. Currently, about 1300+ MT per month of cattle feed is being sold.

It is also the End Implementing Agency (EIA) for various projects implemented by Government of India through National Dairy Development Board (NDDB) under National Dairy Plan 1 (NDP 1). Through these projects they provide their milk producers with integrated animal productivity enhancement services like Ration Balancing Programme (RBP), enabling convergence of milk pooling, improved animal nutrition, higher conception rates and genetically improved animals in the same area to derive maximum benefits under National Dairy Plan (NDP). With these projects, they could also create a state of art facilities and infrastructure for pooling of milk at the village level milk pooling points.

5. Saahaj Milk Producer Company

Saahaj MPC was operationalized on 12th December 2014 and has its Head Office at Agra, Uttar Pradesh. About 60,000 members contributed a share capital of Rs. 8.9 crores in the company as of 31st March 2016. With a turnover of Rs.491 crores, Saahaj MPC on an average procured about 3.7 lakh Kg of milk per day. Saahaj MPC makes bulk supplies to institutions.

6. Mumbai-based Startup Bodhishop deliversdesi Cow products, ensuring cows are not sent to slaughter houses.

India is the world's largest producer of milk. But milk and milk products are also infamous for their high adulteration rate in our country. As per a recent news report, around 68.7 percent of milk and milk products sold in the country are not as per the standards laid down by the Food Safety and Standards Authority of India (FSSAI).

- It is to counter this that Rajas Paranjpe (30) founded Bodhishop in August 2018. The startup is a Mumbai-based marketplace that not only lists and delivers desi cow milk and other products, but also ensures the farmers who sell on its marketplace commit to the welfare of the cows, and not send them to slaughterhouses.

7. Red Cow Dairy

In 1997, Narayan Majumdar started his diairy business by collecting milk from farmers in his village on bicycle. Two decades and many years of struggle later, he can boast of an annual turnover, of Rs.225 crore, three milk processing plants and 22 milk chilling plants spread across eight districts of West Bengal. His company, RED COW DAIRY is one of the largest private sector dairy products supplier in Eastern India. They Procure, Process, Manufacture & Sell cow milk and dairy products by using innovative techniques & integrated management coupled with a highly committed and dedicated team of Professionals. Red Cow Dairy Pvt. Ltd, is committed to achieve and sustain a reputation for providing Quality Dairy Products by deploying trained personnel along with adequate resources in all respect, striving at continual improvement.

Business: They sell 1.8 lakh litres of packaged milk, 1.2 metric tons of paneer, 10 metric tons of dahi, 10-12 metric tons of ghee, 1,500 cans of rasagullas and 500 cans of gulab jamuns every day.

Suggestions for favourable regulatory eco-system for promotion of FPOs

- The Producer Companies Act 2002 envisions PCs as businesses with a potential to grow and sustain. But, most PCs face multiple challenges such as small number of shareholders, low procurement volumes, sub- scale operations, limited value addition capabilities, poor Market linkages, inability to attract talent and lack of strategic thinking and planning.
- Policy framework needed to overcome these challenges and considerations in envisioning, promoting and supporting PCs.
- A simple legal approaches to address issues is need of the hour for the overall health of PCs
- Promote producer companies in a two-tier model at a block or district level, collectively handling multiple-commodities and value-addition and marketing
- A two-tier model also facilitates procurement and value-addition of multiple commodities better than a single-tier model
- Producer Companies Act 2002 to allow PCs to raise external capital through a different class of shares with no voting rights, and with restrictions on the maximum amount of equity per external investor
- To help create such structures, policy makers and practitioners should adopt a two-pronged PC promotion strategy
- bring in business expertise from social enterprises, start-up incubators, funding agencies and entrepreneurship-oriented fellowships to with adequate talent and skill
- A separate identifier be created in the Company Identification Number (CIN) for producer companies as CIN is same with joint stock companies in other sectors
- This will help in tracking and regulation of producer companies
- Data on producer companies should be made available to researchers and practitioners to better inform the design of future policy and interventions.

- Access to reliable data is also important for regulatory purposes for introducing differentiated regulatory requirements for different categories of companies
- Compliance requirements for producer companies should be re-examined keeping in mind the context and capabilities of small producers
- Regulations can be modified either by amending company regulations to allow exemptions for PCs from certain requirements and/or by creating PC specific rules
- Ministry of Corporate Affairs (MCA) should explore the possibilities of differential compliance requirements for PCs
- Lower registration charges should be there for registration of FPOs
- Compliance filings such as director registration and geotagging should be simplified and wherever possible be allowed to be submitted in paper form
- The policy should offer protection for shareholders, similar to SEBI's provisions for shareholder protection in publicly traded companies as the producers are neither aware of their rights nor implications of final decision
- PC shareholders should be recognized as a separate category whose rights must be protected through stronger governance and regulatory mechanisms by amending relevant sections of the Companies Act 2013.
- To address the issue of undercapitalization, Companies Act 2002 should be modified to enable infusion of external equity through a different class of shares with no voting rights
- To minimize the potential for undue influence of external investors, restrict the maximum amount of equity per external investor relative to total farmers' equity

Chapter-5

Principles and strategies of Agribusiness Management

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Introduction:

The Agribusiness system is made up of thousands of businesses, ranging from small dairy farmer, to some of the agribusiness companies in the world. And it is management that drives and directs the firms, farms, and agribusiness companies that come together in the food production and marketing system. A retail supermarket, a rice miller, a local agri-input retailer, and a farmer: each have a person or a group of people responsible for making sure that things get done. These are the managers. Their titles range from chief executive officer to president to foreman to son or daughter or spouse. However, wherever they are found within an organization, managers are responsible for assuring successful completion of the functions, tasks, and activities that will determine an organization's success. Agribusiness management deals with the concepts, processes, ideas, and experiences that can contribute to effectiveness in performing the functions and tasks of agribusiness management.

Key functions of Management in Agribusiness

The responsibilities of managers in agribusiness are highly varied and can range from ordering inputs, to hiring and firing individuals, to making the decision to sell a multi-billion dollar international subsidiary. A chief executive officer, for instance, is responsible for the overall activities of a large, diversified food or agribusiness firm. In such firms, teams of managers are likely responsible for specialized areas within the firm. On a smaller farm business, one individual may assume roles ranging from chief executive officer, to manager, to labourer, managing multiple projects at different levels simultaneously. To better understand the form and process by which managers perform the tasks that are required to create and sustain a viable business, the practice of management can be broken down into four key functions:

- Marketing management
- Financial management
- Supply chain management
- Human resource management

Ultimately, no matter how large or small the firm, managers have responsibilities in each of these areas.

Marketing Management

Marketing, in a broad sense, is focused on the process by which products flow from producer to final consumer. It involves the physical and economic activities performed in moving products from the initial producer through intermediaries to the final consumer. Marketing management involves understanding customer needs and effectively positioning and selling products and services in the marketplace. In agribusiness, marketing management is a key function within each of the sectors of agribusiness: the food sector, the production agriculture sector, and the input supply sector. Marketing management represents an integration of several different activities: selling, advertising, web page design, promotions, marketing research, new-product development, customer service, and pricing — all focused on customer needs, wants, and, ultimately, the quest for customer satisfaction. It is this function of management that is most closely focused on the end-user, or the consumer/customer of the product or service produced. It is often argued that without satisfied customers effectively reached through marketing and sales, no business could successfully operate. Thus, marketing management plays a fundamentally important role in most food and agribusiness firms. Marketing management is focused on careful and planned execution of how, why, where, when and who sells a product or service and to whom it is sold. Decisions here include what products to produce, what services to offer, what information to provide, what price to charge, how to promote the product, and how to distribute the product. This management function is closely tied to the customer's decision processes, and buyers differ widely in the food production marketing system — from a consumer for her own consumption, to an institution like hotels, restaurants and café (HoReCa) to a food processing firm, to a large agribusiness company. The ways in which all these agribusiness buyers make a purchase decision continues to evolve and change.

Financial management

Profit is the driver for agribusinesses as they work to generate the greatest possible returns from their resources. Successful achievement of this objective means making good decisions, and it means carefully managing the financial resources of the firm. Financial management is involved in these areas and includes generating the data needed to make good decisions, using the tools of finance to make effective decisions, and managing the assets, liabilities, and owner's investment in the firm. Financial information allows managers to understand the current "health" of the firm as well as to determine what actions the business might take to improve or grow. Balance sheets and income statements can provide a wealth of information useful in making decisions. Financial analysis provides agribusiness managers with insights by which to better base decisions. The tools of finance such as budgeting, ratio analysis, financial forecasting, and breakeven analysis can be used by agribusiness managers to develop long-range plans and make short-run operating decisions. Another way in which the financial agribusiness scene continues to change is in the sourcing of funds. Agribusiness firms are increasingly accessing larger amounts of funds or money from capital and financial markets. To be competitive in those markets, firms must generate rates of return comparable to other industries. In the past, small agribusiness companies may have been allowed by local lenders to exhibit only modest financial performance. Today, the national and international financial markets expect performance in agriculture comparable to that in other industries if they are going to provide the agribusiness sector with the funding needed for expansion, growth, consolidation, technological advancement, and modernization.

The sheer amounts of funds needed to finance the future operations of a company will continue to increase dramatically. So will the need for managers who understand the tools and techniques used to source and manage those funds. For most agribusinesses, financial management is a critical component of agribusiness management.

Supply chain management

New technologies and concepts are rapidly hitting the workplace. This, in turn, changes the way agribusinesses do what they do. The push for quality, the drive for lower costs, changes in the supply chain, and general pressures to be more efficient in meeting consumer demands is swiftly altering the production and distribution activities of agribusiness. Supply chain management focuses on these areas and provides the tools managers need to meet these operations and logistical challenges. As a result, supply chain management has come to the forefront as a key management function for the agribusiness manager. Operations management focuses on the direction and the control of the processes used to produce the goods and services that we buy and use each day. It involves several interrelated, interacting systems. Operations management involves the strategic use and movement of resources. For instance, an ice-cream factory begins its process with milk from a dairy farmer and ends with many flavoured ice-creams, etc. Managers must worry about issues of scheduling, controlling, storing, and shipping as milk from the farmer till the retail outlet. Logistics management involves the set of activities around storing and transporting goods and services. Shipping and inventory costs are huge costs of doing business for many food and agribusiness firms. The logistics management function is focused on new ways to lower these costs, by finding better ways to ship and store product. Given advances in information technology, the analytical tools of supply chain management, and improved shipping technologies, this has been a dynamic area for food and agribusiness firms. In addition, the growth of global markets depends upon the performance of well managed supply chains. Successful agribusinesses are those who consistently produce faster, better, and cheaper. The management of logistics in food and agricultural supply chains will become increasingly focused on building such time-based advantage. Quicker response to consumer needs, faster delivery times, shorter product development cycles and more rapid recovery after service problems are all components of time-based advantage in supply chain management. At the same time, there is an incredible push for quality, safety, and integrity in food system production processes. Effective supply chain management will continue to be crucial in the successful execution of any strategic plan for agribusiness firms.

Human resources management

Management is about people. Without the ability to manage the human element, the resources each business has in its employees, businesses fail. When combining efficient management of the marketing/finance/supply chain functions of the business, with the thoughtful management of the human side of the business, managers are on the road to successful implementation of their strategy. Agribusiness managers who can manage people well can significantly impact both productivity and financial success. Human resources management encompasses managing two areas: the mechanics of the personnel administration, and the finer points of motivating people to offer and contribute their maximum potential. Decisions here include how to organize the firm, where to find people, how to hire them, how to compensate them and how to evaluate them. Today's lean agribusiness firms continue to demand more performance from their managers, sales force, and service and support

personnel. For instance, in addition to sound selling skills, sales representatives are expected to have intimate knowledge of technology and a fundamental understanding of the general management problems of their producer customers. Service personnel must be able to maintain increasingly complex equipment. Technical support staff needs to be experts at assimilating and using the massive amount of production data that a large dairy farm or crop farm using site-specific management practices will generate.

These types of demands will require agribusinesses to hire individuals with greater initial skills as well as with the ability to grow into different jobs throughout the course of their careers. Agribusinesses need to be flexible while providing continuing education and development of key skills. Some examples of such skills are general business, negotiation, problem-solving, technical, information management, and communication. Recognition of raw ability, and then development and fine-tuning these skills and abilities will be the human resource challenge. This is the role of human resource management in the food and agribusiness firm.

The four key tasks of agribusiness managers

The functions of management address four key areas (marketing, finance, supply chain management, and human resources) of the firm. Any food or agribusiness firm must make decisions in all four areas. All effective agribusiness mangers execute four principle tasks in their work:

1. **Planning:** Planning can be defined as forward thinking about courses of action based on a full understanding of all factors involved and directed at specific goals and performance objectives.
   The three types of planning are strategic, tactical, and contingency.
   Strategic planning is focused on developing courses of action for the longer term. Long term may be two or three years for a very small agribusiness, while a major corporate organization may be looking at a 20-year (or longer) time horizon.
   Tactical planning involves short-term plans consistent with the strategic plan. As such, tactical plans are a crucial part of implementing the agribusiness firm's strategic plan. While strategic planning is focused on what we do in three years (or five years, or 20 years), tactical planning is focused on what we do tomorrow (or next month, or next year).
   Contingency planning is the development of alternative plans for various possible business conditions. It is part of the strategic and tactical planning process for a firm. A contingency plan provides guidance when something unexpected happens. Some contingency planning is conducted to prepare for potential crises that may occur.
   Levels of Planning: The three levels of planning include strategic, tactical and operational levels. As the level of planning moves from the chief executive to the line worker, several changes occur. At top management levels, plans are strategic and have a tendency toward flexibility, are longer range, are usually written, are more complex, and are broader in nature. At the lower levels, plans are specific in nature, are for immediate action, are usually unwritten, and tend toward simplicity.

Strategic Level	**Tactical Level**	**Operational Level**
Top Management	**Middle Management**	**Line Employees**
Very Flexible Long-term	Somewhat Flexible Intermediate-term	Inflexible Immediate

Written Analyses	Written Reports	Unwritten
Complex, Detailed	Less Detail, Outlined	Simple
Broad	General	Very Specific

2. **Organizing:** Organizing represents the systematic classification and grouping of human and other resources in a manner consistent with the firm's goals.
   Organizing involves:
   a. Setting up the organizational structure
   b. Determining the jobs to be done
   c. Defining lines of authority and responsibility
   d. Establishing relationships within the organization
3. **Directing:** Directing involves leading, supervising, motivating, delegating, and evaluating those whom you manage. It is accomplished by:
   a. Selecting, allocating, and training personnel
   b. Staffing positions
   c. Assigning duties and responsibilities
   d. Establishing the results to be achieved
   e. Creating the desire for success
   f. Seeing that the job is done and done properly
4. **Controlling:** The controlling task represents the monitoring and evaluation of activities. To evaluate activities, managers should measure performance and compare it against the standards and expectations they set. In essence, the controlling task assesses whether the goals and performance objectives developed within the planning task are achieved

Each of these tasks plays a part of the agribusiness manager's overall role in managing the people and events within his/her power to generate the best possible outcome for the organization. Each task deals with a specific aspect of what agribusiness managers do as they manage.

Unique dimensions of the food and agribusiness markets

It may be easy to argue that management theory and principles are the same for any type of business enterprise. The large businesses in the country such as ITC and Venky's and the smallest one-person agribusiness are guided by many of the same general principles. And, in many cases, good management is good management, regardless of the type of firm, or the market it is operating in.

Yet key differences between large and small businesses or between agribusinesses and other types of firms arise in the specific business environment facing the organization. While there are similarities, the markets facing the wide range of businesses differ substantially. The automotive industry is different from the retail industry. Likewise the unique characteristics of the food production and marketing system cause management practices to differ for agribusiness firms. It is very much essential to understand the similarities and differences in the functions and tasks of a food and agribusiness manager compared to other managers.

As a professional, the manager might be compared to a physician. The knowledge and principles of medicine are the same, but patients differ in such vital details as age, gender, body mass index, and general health. The physician's skill is to apply general medical principles to the specific individual

to create the optimal outcome for the patient given the unique set of circumstances at hand. The manager, utilizing specific tools of marketing, financial, supply chain management, and human resource management, must attempt to solve the problem at hand and create the best outcome for the firms long-term profitability. Food and agribusiness markets differ from other markets in at least eight key ways, influencing the business situation that food and agribusiness managers must practice. While one can find examples of other industries where each point is important (for example, seasonality is important to toy companies), combined these factors form the distinguishing features of the food and agribusiness marketplace.

Food as a product:

Food is vital to the survival and health of every individual. Food is one of the most fundamental needs of humans, and provides the foundation for economic development — nations first worry about feeding their people before turning their attention to higher order needs. For these reasons, food is considered a critical component of national security. And, as a result, the food system attracts attention from governments in ways other industries do not.

Biological nature of production:

Both crops and livestock are biological organisms — living things. The biological nature of crops and livestock makes them particularly susceptible to forces beyond human control. The variances and extremes of weather, pests, disease, and weeds exemplify factors that greatly impact production. These factors affecting crop and livestock production require careful management. Yet in many cases, little can be done to affect them outright. The gestation cycle of a dairy cow or the climate requirements of feed grower provide examples.

Seasonal nature of business:

Partly because of the biological nature of food production, firms in the food and agribusiness markets can face highly seasonal business situations. Sometimes this seasonality is supply driven — large amounts of maize and soybeans are harvested during September-October. Sometimes this seasonality is demand driven — the market for ice cream has a series of seasonal peaks and valleys. Such ebbs and flows in supply and demand create special problems for food and agribusiness managers.

Uncertainty of the weather:

Food and agribusiness firms must deal with the vagaries of nature. Drought, flood, insects, and disease are a constant threat for most agribusinesses. All market participants, from the banker to the crop production chemical manufacturer are concerned with the weather. A late monsoon can create massive logistical problems for firms supplying inputs to the crop sector. Bad weather around a key holiday period can ruin a food retailer's well-planned promotional event.

Types of firms:

There is tremendous variety across the types of businesses in the food and agribusiness sectors. From farmers to transportation firms, traders, wholesalers, processors, manufacturers, storage firms, financial institutions, retailers, food chains, and restaurants — the list is almost endless. Following a milk chocolate from the time feed and fodder are prepared for shipment to the dairy farmer until its placement on the retail outlet's shelf involves numerous types of business enterprises. The variety in

size and type of agribusinesses, ranging from big companies to family farms, shapes the food and agribusiness environment.

Variety of market conditions:

The wide range of firm types and the risk characteristics of the food and agribusiness markets have led to an equally wide range of market structures. Crop farmers can be considered as case of the perfectly competitive market where individual sellers have almost no influence over price. At the same time, Coca-Cola and PepsiCo have a literal duopoly in the soft drink market. Some markets are global, others local. Some markets are characterized by near equal bargaining power between buyer and seller, while others may be dramatically out of balance in one direction or the other.

Rural ties:

Many agribusiness firms are located in small towns and rural areas. As such, food and agribusiness are likely the backbone of the rural economy and have a very important role in rural economic development.

Government involvement:

Due to almost every other factor raised above, the government has a fundamental role in food and agribusiness. Agriculture is a state subject in India. Some government programs influence commodity prices and farm income. The Commission for Agricultural Costs and Prices declares the minimum support price (MSP) of many commodities. The government has several schemes for promoting crop and livestock.

Each of these special features of the food production and marketing system affects the environment where an agribusiness manager practices their craft. Agribusiness is unique and thus, requires unique abilities and skills of those involved with this sector.

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Chapter-6

MARKET LED EXTENSION AND ADVISORY SERVICES IN LIVESTOCK SECTOR

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Introduction

Present agricultural and livestock scenario is full of challenges and threats of international competition even in our local markets. Also there are many new opportunities available to rural people to make use of and enhance their remuneration from farming. Earlier the agricultural and livestock sector was production based but modern agriculture and livestock sector is to be developed essentially on the lines of market based economy. With major thrust of extension agencies focused on production techniques till now, market-led extension holds the key to the future. This assumes greater significance in the light of the new international trading regime under WTA and the export opportunities being opened up. Public extension functionaries are presently ill equipped to deal with such challenges. The multi-agency extension service will need to address these issues though strengthening capacity of the public agency, supporting private sector in market led extension and marketing, extensive use of media in information and technology dissemination.

The livestock sector in India has grown substantially over the years. As a result of prudent policy intervention, India has a prospective livestock production. Despite this entire scenario, the marketing of livestock and its products has been a major challenge for small and landless farmers which might be due to various factors. It should be noted that, extension system has played its role untiringly in transfer of production technologies from lab to land besides the scientists, farmers and marketing network. With major thrust of extension agencies focused on production techniques till now, market-led extension holds the key to the future. The multi-agency extension service will need to address these issues though strengthening capacity of the public agency, supporting private sector in market-led extension and marketing, extensive use of media in information and technology dissemination. Market-led extension so far is a peripheral issue in the extension scenario will need to be brought center-stage.

With the globalization of market, farmers have to transform themselves from mere producers-sellers in the domestic markets to producer cum seller in a wider market sense to best realize the returns for his investments, risks and efforts. This to be achieved, farmers need to know answers to questions like what to produce, when to produce, how much to produce, when and where to sell, at what price and form to sell his produce. An efficient marketing system is essential for the development of the agricultural sector. Failure to develop the agricultural and livestock marketing system is likely to negate most, if not all, efforts to increase agricultural production (FAO, 2000). Extension education needed to be focused on marketing aspect, particularly on to produce more quantitative and qualitative products for export-oriented standard from existing available resources to

create the new avenue of income generation (Singh, *et al* 2004). One of the most important is the information and extension services to farmers besides transport & communication facilities, public utility supply, like water, electricity, fiscal and trade administration and public storage, market and abattoir facilities (FAO, 2000).

Paradigm Shift from Production-led Extension to Market Led Extension

Aspects	Production-led extension	Market-led extension
Purpose/objective	Transfer of production technologies	Enabling farmers to get optimum returns out of the enterprise
Expected end results	Delivery of package of practices	High returns
Farmers seen as	Progressive farmer High producer	Farmer as an entrepreneur
Focus	Production	Whole process as an enterprise
Technology	Fixed package recommended for an agro-climatic zone covering very huge area irrespective of different farming situations	Diverse baskets of package of practices suitable to local situations/ farming systems
Extensionists' interactions	Messages Training \ Motivating Recommendations	Joint analysis of the issues varied choices for adoption Consultancy
Linkages	Research-Extension-Farmer	Research-Extension-Farmer extended by market linkages
Extensionists' role	Limited to delivery mode and feedback to research system	Establishment of marketing and agro processing linkages between farmer groups, markets and processors
Maintenance of Records	Not much importance as the focus was on production	Very important as agriculture viewed as an enterprise to understand the cost benefit ratio and the profits generated
Information Technology support	Emphasis on production technologies	MI including likely price trends, demand position, current prices, market practices, communication network,

Basics of market led extension

* Market oriented production
* Updated knowledge of market
* Market intelligence
* Use of technology
* Appropriate extension approaches

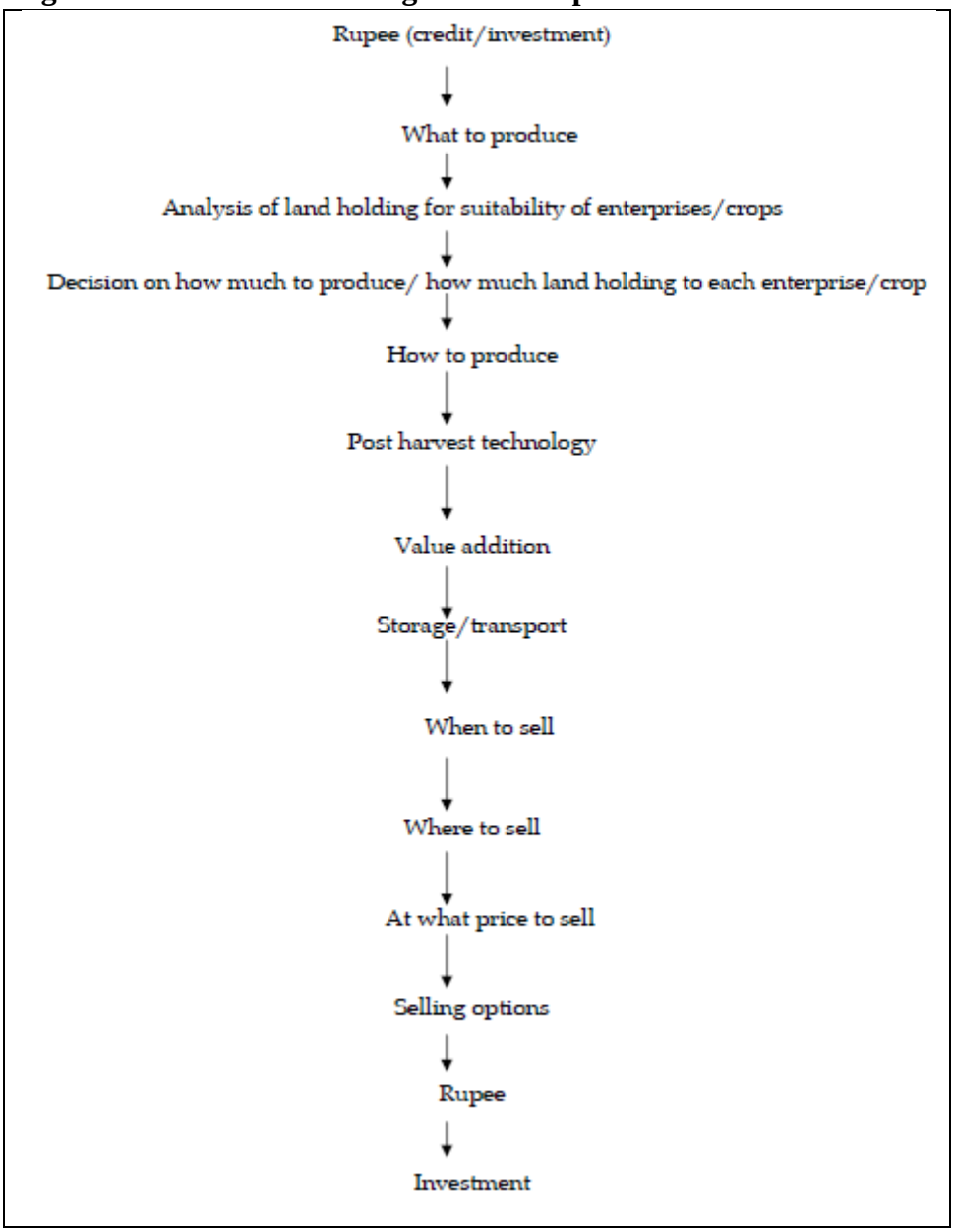
Problems related with market led extension

Production related	* Seasonality of production: Supply not uniform * Perishability of produce leading to storage problem. * Bulkiness of production: Transportation problem
Market related	* Non - availability of market information * Existence of middleman * Inferior quality of produce
Extension related	* Lack of communication skills * Lack of credibility * Insufficient information related with market

Market Led Extension: Need of the Hour

The paradigm shift of present scenario especially in India context as well as globally spurs for all hands to be on desk to transform Agriculture and livestock sector into worthwhile and profit oriented business through the intervention of Market Led Extension. Farmers which are the producer and the almost receiver of the shocking wave in the sector must be taking care of in terms of building their capacity to face the challenge of the hour. Indian livestock sector has been characterized with high input cost, lack of access to quality information especially information about markets, lack of labour as a result of rural urban migration, lack of infrastructure facility, large number of market functionaries, lack of grading and standardizing, good storage facilities, lack of market intelligence among others which resulted in high marketing cost and minimum share in consumer's rupee.

Flow chart of agriculture/livestock farming as an enterprise



Challenges related with market led extension

- The challenge is to motivate the extension personnel to learn the new knowledge and skills of marketing before assigning them marketing extension jobs to establish their credibility and facilitate significant profits for the farming community.
- Success stories of profitable ventures by farmers need to be publicized. A whole network of skilled personnel needs to be engaged in collection of current information and creation of relevant websites pertaining to/serving specific needs of farmers.
- Generation of data on the market intelligence would be a huge task by itself. There is a dire need to upgrade basic facilities and free the extension cadres from the shackles of the hygiene factors and enthuse them to look forward for the motivating factors like achievement, job satisfaction, recognition etc.
- Reorganization of the extension system to focus on both extension and market led extension may be emphasized in the departments.

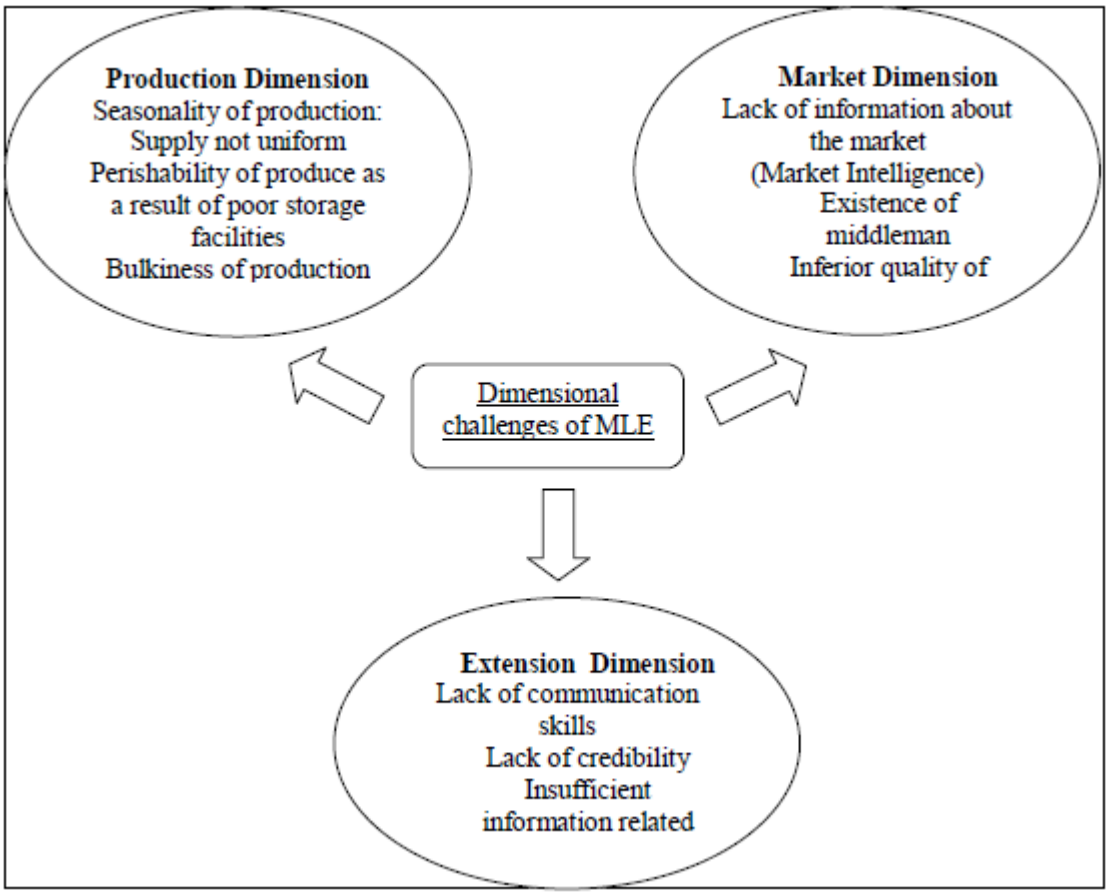
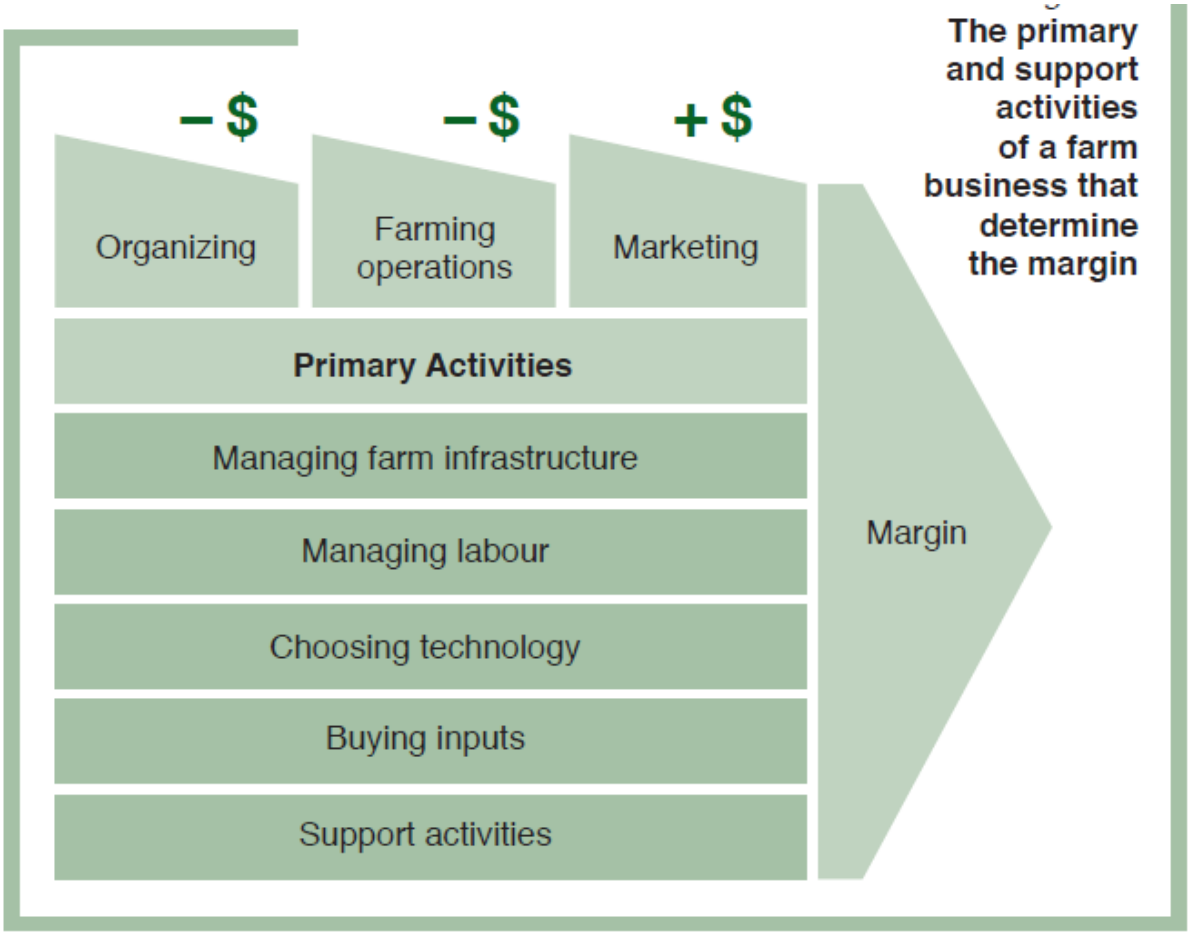


Fig. Three Dimensional challenges of Market Led Extension (Shitu *et. al*., 2013)

- Training programme for extension professionals- It makes them skilled, able to take decision according to situation.
- Basic concepts and issues in markets and marketing
- Introduce market-oriented approach into extension
- Development of local market and promoting local consumption
- Entrepreneurial training to farmers
- Linking farmers to markets

- Market reforms- It includes partnership with KVK & ATMA for effective technological reach.
- To facilitate the State Governments, Ministry of Agriculture should frame model rules and procedures for circulation to states as guidelines.
- Formation of Market-Led Extension policies and its implementation



(FAO, 2013)

Information to be delivered by extension system to farmers in the context of MLE

- The present agricultural and livestock scenario and land pattern
- Suitability of livestock holding, species, breeds, fodder in different regions and contexts
- Direct marketing by farmers may be encouraged as an innovative channel.
- Credit facilities- Helps farmers to arrange quality of input required for production
- Desired qualities of the products desired by consumers- needed for competitive marketing.
- Market network of the local area and the price differences in various markets Network of storage and warehouse facilities available.
- Production technologies and processes like improved breeds, feeds and fodder, health care, breeding aspects etc.
- Post-harvest management like processing, grading, standardization of produce, value addition, packaging, storage, certification, etc. with reference to livestock and its products. Value addition is the process of changing or transforming a product from its original state to a more valuable state.

- Transport facilities since majority of the livestock products are perishable.
- Contract farming- Contract farming that helps infusion of new technology and capital in farm business should be popularized and encouraged.
- Information about integration of components like agriculture, livestock, horticulture etc.
- Nearby agencies or organizations dealing with a particular product or production system
- Food retail chains- Major conditions for successful interlocking between agribusiness firms and small producers.
- Increased competition for procurement, guaranteed market for farmers produce, effective repayment mechanism, and market information for farmers, which should be adequately recognized in evolving agreements.
- Market information, intelligence and forecasting
- Operational and managerial difficulties in livestock production
- Food safety and quality standard- Should promote consumer demand for safe and healthy foods, so that the demand will drive the implementation of food safety measures, which will ultimately enable us to capture global markets.
- Price incentives can provide demand-pull for quality and safe food.

Role of extension personnel in light of market-led extension

- SWOT analysis of the market
- Organization of Farmers' Interest Groups (FIGs), FPOs etc.
- Supporting and enhancing the capacities of locally established groups under various schemes/ programmes
- Enhancing the interactive and communication skills of the farmers.
- Establishing marketing and agro-processing linkages between farmers' groups, markets and private processors.
- Educating the farming community about different inputs, practices, methods to decrease cost of production and improve income, limitations etc. in livestock production
- Direct marketing-farmers need to be informed about the benefits of direct marketing.
- Capacity building of FIGs in terms improved production, post harvest operations, storage and transport and marketing.
- Acquiring complete market information, intelligence and forecasting regularly on various aspects of markets
- Creating awareness about value addition of livestock products to improve the income level.
- Linking the producers or farmers to markets
- Regular usage of internet facility through computers to get update on market intelligence
- Production of video films of success stories of community specific farmers

Extension Strategies for Market Led Intervention

Without mincing words, innovative strategies embedded in extension principle and practices is a sure way to linking the farmers to market. One of these strategies is the timely initiatives of marketing the produce through FIGs, Commodity groups as well utilization of other group approaches. This will ultimately enable the participation of various stakeholders in marketing agricultural produce thereby maximizing their potentials for maximum profit. Also, another

profitable extension strategy is the utilization of principle of e- extension for marketing purposes. This can be done through initiation of online marketing system through farmers-traders-wholesalers and monetary transaction (eg. AMUL MODEL). Also, the introduction of subsidies provision for postharvest management practices as well as value addition can go a long way in minimizing the challenges of post-harvest loss. Public-Private Organizations should also give emphasis on forward linkages of both crop and animal enterprises in addition to Non- Farm Activities at villages. Moreover, there should be adequate provision of credit facilities for storage transportation, grading, value addition, packaging activities for farmers/farm women/rural youth with proper and strategic monitoring and evaluation per the extension functionaries.

CONCLUSION

The focus of the extension functionaries need to be extended beyond production. Farmers should be sensitized on various aspects on quality, consumer's preference, market intelligence, processing and value addition and other marketing information. This will help the farming community to realize high returns for the produce, minimize the production costs, and improve the product value and marketability. Extension functionaries need to work more on the area of marketing through the use of extension strategies to disseminate not only production but essentially marketing related information for holistic sustainable Agricultural development. Information technology, electronic and print media need to be harnessed to disseminate the production and market information. In order to be successful in the liberalized market scenario, the farmers have to shift their focus from 'supply driven' to market driven' and produce according to the market needs and earn high returns.

REFERENCES

- FAO (2000). Agricultural marketing: concepts, policies and services, FAO
- FAO (2013).Market Oriented Farming: An overview. Eds. David Kahan, FAO pp:104
- Shitu, G. A., Sakia, R., Meti, S. K. and Maraddi,G. N..(2013). Market Led Extension; Prospects and Challenges for Agricultural Sustainability in the 21st Century. Paper presented at the International Conference on "Extension Educational Strategies for Sustainable Agricultural Development – A Global Perspective" University of Agricultural Sciences, Bangalore, India December 5th – 8th, 2013.
- Singh, B. P., Tiwari, R. And Mandape, M. K. (2004). Market oriented extension education for livestock development. Indian Dairyman. 56 (9).

Chapter-7

PROCESSING AND VALUE ADDITION OF LIVESTOCK PRODUCTS

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Introduction

Modern society is characterized by an increasing consciousness about the nutrition and growing interest in the role of food for maintaining and improving human well-being as well as consumer health. Changing consumer demands and increasing global competition are triggering the meat sector to embrace new processing technologies and new ingredient systems to develop high quality and convenient meat products with natural flavour and fresh appearance without much loss in the nutritional configuration. This is likely because the long standing positive consumer perception that meat and meat products are very good sources of minerals, vitamins, and contain "complete" proteins is gradually giving way to a more negative view (Verbeke et al., 2010). Meat and meat product consumption is gradually being seen as causes for increased risks of attracting chronic diseases such as obesity, cancer and stroke. Therefore, value addition of meat products via incorporation of novel ingredients and processing technologies are being seen as an opportunity to improve the "image" of meat and address consumer needs.

Processing of value added meat products

United States Department of Agriculture (USDA) defines value added products as "A change in the physical state or form of the products and production of a product in a manner that enhances its value as demonstrated through business plan" or "The physical segregation of commodity or product in a manner that result in the enhancement of the value of that commodity or product". Processed meat products, which include different types and local/regional variations, are foods of animal origin, which contribute valuable animal proteins to human diets. Animal tissues, in the first place postmortem muscle (meat) and fat are the main ingredients, besides other tissues such as internal organs, skins and blood or ingredients of plant origin. All processed meat products have been in one way or another physically and/or chemically treated. These treatments go beyond the

simple cutting of meat into meat cuts or meat pieces with subsequent cooking for meat dishes in order to make the meat palatable. Postmortem muscle that has gone through major physical or chemical alterations is generally considered processed meat. Simple handling of fresh meat in retail stores (making into different cut-up parts) and in homes (e.g. cutting, grinding and minimal packaging) or preservation using refrigeration or freezing is generally excluded from the definition of meat processing. Therefore, in broad sense meat processing may include particle size reduction (mincing), marination or mixing with various additives, protein extraction, chemical and enzymatic treatments, massaging or tumbling, curing, smoking, stuffing, canning or any other process that alter the freshness of meat. Meat which undergoes any of the aforesaid physical, chemical or enzymatic process is also called further processed meat. Meat processing involves a wide range of physical and chemical treatment methods, normally combining a variety of methods. Based on their processing type meat products may be roughly classified into 8-10 groups (Table 1).

Table 1. Meat and meat products by processing type

Product Type	**Examples**
Sectioned and formed meat products	Beef rolls, Turkey rolls, Boneless hams etc.
Emulsion meat products	Nuggets, Meat balls/kofta, Emulsion sausages
Restructured meat products	Restructured meat loves/slices
Ground meat products	Ground meat patties
Enrobed meat products	Enrobed wings, drummettes, Enrobed patties
Cured and smoked meat products	Ham, Bacon
Dried meat products	Beef jerky, Pastrami
Canned/retort pouched meat products	Vienna sausages, Corned beef
Fermented meat products	Salami sausages

Adopted from Sen *et al.* (2013)

Sectioned and formed meat products are prepared from pieces or chunks of meat that are bonded together to form a single fused piece. Whereas, emulsion meat products are processed by mixing or chopping meat and water with the addition of common salt (NaCl) until a fine, protein-rich slurry is formed. This matrix is then capable of binding fat, water and other non-meat ingredients. After cooking, the salt soluble proteins are coagulated and this results in an immobilization of the fat, water and other constituents. All varieties of sectioned and formed meats, ground and comminuted meat products may be included under restructured products. Restructure meat products are partially

or completely disassembled and then reformed into the same or a different form. Ground meat products are nothing but restructured meat products, wherein minced or ground meat and fat is added with non-meat ingredients and then mixed in a meat mixer or massager to facilitate extraction of meat proteins and binding. Enrobing also called as coating is nothing but applying an edible coating material around the product. Curing, also known as salting is the oldest form of preservation of meat where smaller meat pieces or bigger cuts either deboned or with bone is dipped in/injected with curing brine/pickle solution consisting of salt, phosphate, nitrate/nitrite, ascorbate, sugar dissolved in potable water. Smoking is done to impart a unique smoke flavor and aroma and to give the surface a uniform smoked colour. Dried meat products are classified into low moisture foods and intermediate moisture foods. Low moisture foods are defined as those having a water activity (a_w) of less than 0.60 and containing less than 25% moisture. Intermediate moisture foods have a_w between 0.60 and 0.85 and contain less than 50% moisture. Fermented meat products are produced by mixing chopped or minced meat, fat, curing salt and/ or sugar together with spices, herbs and other plant materials (carbohydrates) with salt tolerant lactic acid producing bacteria (starter culture e.g. *Lactobacillus lactis, Leuconostoc Sp.* and *Bifidobacterium Sp.*), vacuum stuffed and subjected to various temperature and humidity conditions.

Advances in meat processing systems

In the last century, several alternative or complementary preservation technologies to classical processing were developed. A good example is ***gamma irradiation***, which is completely effective for food decontamination yet its consumer acceptability is low. For this reason, during the last decade different approaches have been studied and as a consequence there are several promising technologies currently being evaluated in meat industry.

High pressure processing (HPP)

HPP is a very promising technology for the preservation of meat products, and shows a big potential for the innovative development of new products with a relatively low energy consumption. It uses an isostatic pressure at room temperature and between 100 and 600 MPa. The pressure chamber is loaded and closed, degassed and the pressure is transmitted by the pumps through a liquid, generally water. HPP at low or moderate temperature causes destruction of microbial vegetative cells and enzyme inactivation, without changing the organoleptic characteristics of the product and leaving the vitamins intact. The HPP treatments can induce special effects on the

products' texture and structure of a given food and accordingly can be used for the development of new products or to increase the functionality of some ingredients.

Sous-vide processing

Sous-vide means "under vacuum" in French, and the term describes both the process and end product. It is an advanced method of cooking whereby fresh food is vacuum sealed in heat-stable, high barrier plastic pouches or films, and then cooked (pasteurized) to a time-temperature combinations sufficient to destroy vegetative pathogens but mild enough to maximize the sensory characteristics of the product. This is followed by rapid chilling to avoid germination and outgrowth of surviving bacterial spores, stored refrigerated, and reheated before consumption. Advantages associated with *sous-vide* processing include superior flavour profile, increased tenderness and moisture, colour retention, nutritional loss reduction, inhibition of oxidative changes and enhancement of shelf life (Vaudagna et al. 2002). In meat products, the most important disadvantage associated with this technology is the retention of the juices inside the package while thermal treatment (Szerman et al. 2007).

Pulsed electric fields (PEF)

It is a treatment that involves the application of direct current voltage pulses for very short periods of time usually in the range between microseconds to milliseconds, through a material placed between two electrodes. Operation of PEF involves induction of an electric field (kV cm^{-1}) on a food placed between two electrodes and energy is delivered into the food in the form of short wave pulses. This voltage results in an electric field, the intensity of which depends on the gap between the electrodes and the voltage delivered. Depending on the intensity of the field, changes in the cell membrane can occur, which can lead to the formation of temporary or permanent pores and eventual loss of cell viability by a mechanism known as electroporation (O'Dowd et al. 2013). This mode of action by PEF treatments is also responsible for the inactivation of vegetative forms of bacteria, yeast, moulds and some enzymes related to food quality. This technology when applied to muscle foods, could offer fast and cost efficient alterations to the muscle cell structure and meat tenderness which in turn could be of major benefit to the meat industry. To date, the following four main processing concepts related to the PEF treatment of meat can be summarized (Jaeger et al. 2012):

(1) Improvement of the impregnation during dry and wet curing.

(2) Acceleration of water removal during drying.

(3) Release of intracellular enzymes to influence maturing.

(4) Modification of water binding due to microdiffusion of water binding agents.

Advances in meat packaging

Numerous different technologies, systems and equipment are currently used for processing and packaging case-ready fresh red meat or meat products. Important current fresh meat technologies used commercially are master packs and MAP with mixtures of O_2 and CO_2 or O_2 , CO_2 and N_2 (Brody, 2007), but development of lipid and pigment oxidation during storage with high (greater than 50%) O_2 led to the use of 0.4% CO with CO_2 and/or N_2 rather than O_2. This extended the shelf life of most fresh meat from less than 16 days to more than 30 days (McMillin, 2008).

Successful packaging systems require more than packaging materials, so active and intelligent packaging, biobased plastics and products like labels, absorbent pads, tags and others are among packaging advances (Harrington, 2011). Active packaging has been incorporated into meat systems to emit or absorb O_2, CO_2, odors and aromas; delay oxidation; inhibit microbial growth; and mitigate moisture migration (Ozdemir and Floros, 2004). Control of purge with absorbent or soaker pads keeps meat products fresh, protects packaging systems from unsanitary meat juices and creates an aesthetically attractive package (Fernandez *et al* ., 2010). Intelligent packaging may provide direct or indirect product quality changes due to microbial growth or chemical changes (Kerry *et al*., 2006). It includes temperature indicators, time-temperature integrators and sensors for temperature, moisture and gases. Gas sensors respond to respiratory gases while biosensors measure biological changes such as ripeness or spoilage that generate volatile compounds. Enzymatic sensors may sense hydrolysis of a substrate that changes pH, which is indicated by a color change. Time-temperature indicators are common for meat industry applications when temperature abuse may be suspected. Much of the sensor technology is still in developmental stages and not yet commercially available.

Heritage meat products of India

The ethnic meat products have percolated down through the history and culture of this country and have metamorphosed into spicy dishes. The diversity of India has had an impact on the type of meat products available in different parts of the country. The meats common to the region are kabab, tikka, biryani, curry, meat pickle, and dry salted meat. The north has tandoori, Kashmiri wazwan meats comprising of rogan josh, nate-yakhni, tabak manss, aab gosht, rista, goshtaba, and shaljam gosht; the south has Hyderabadi haleem, Chettinad dishes of Tamil Nadu, and Kerala lamb stew; the

west has Kolhapuri mutton and Goan vindaloo; and the east has momo/dumpling, rapka, kargyong, korma, dopiyaza, etc.

The following table presents a brief profile of the ethnic Indian meat products:

Products	Profile
Biryani	Mmeat dish made with basmati rice, blended and highly flavored with fried condiments and seasonings
Goan Vindaloo	Meat preparation of Goa using pork, pheni (wine made out of cashew), garlic and other spice mix
Haleem	A type of meat porridge especially famous during ramzan in Hyderabad prepared from meat, whole wheat, and lentils along with spices, condiments, and constantly stirred to make a thick semisolid mass
Kabab	Comminuted meat product made out of minced meat or small cuts of meat, which is charbroiled to a give smoky flavor
Kargyong	An ethnic sausage-like product from the Himalayan region prepared from yak meat or beef or pork and called yak or lang or faak kargyong, respectively
Kashmiri wazwan meats	Specialty meat products of the Kashmir Valley; traditionally prepared by experienced chefs called wazas Ex. Rogan josh, nate-yakhni, tabak manss, aab gosht, rista, and goshtaba
Keema	A comminuted meat product prepared from less value cuts of meat
Kolhapuri mutton	Prepared from goat or lamb meat, comprising three components: tambada rassa (red curry), phandhara rassa (white curry), and mutton sukka (roasted mutton)
Meat pickle	A ready to eat, convenient, intermediate moisture meat product which can be preserved for long time at ambient temperature
Momo	Meat fillings of minced pork or any other meat and are stuffed in flattened dough made of wheat flour along with finely chopped onions, ginger, garlic, coriander, and vegetables
Tandoori	Marinated tender flesh cooked in an earthen tandoor by smoking, grilling and baking, which gives it a typical flavor
Tikka	Boneless chicken cut into small pieces and baked like tandoori in a tandoor following marination in spices and yoghurt

The traditional meat products have immense potential to generate income and employment for the local people. At present there are many products that are not scientifically standardized and comprehensive informations are not available for their commercial production, packaging and marketing. Thorough knowledge of their formulations, process optimization, advanced packaging, and cold chain for distribution could definitely put many of them on the world map. Retort pouch processing can also be applied to some of the ethnic meat products to exploit their market potential.

Challenges

In the near future, the new processing technologies will very likely replace current technologies but before implementation of the new technologies, several issues need to be addressed such as: the identification of the most resistant and relevant microorganisms in meat habitat, the mechanisms of microbial resistance and adaptation to these technologies, the robustness of the technologies, the increased safety versus current technologies and last but not least, the legislation needed to implement them. Moreover, the new technologies are still costly, mainly because of the initial capital expenditure, and this may limit their application. It is expected than these costs will go down as a consequence of further progress in technology, the acceptance and resultant investment in the requisite equipments by an increasing number of manufacturers. The need to convince consumers and stakeholders about the improvement of these new technologies, is also crucial. Meat scientists have an important role to play in this process. They are uniquely positioned to bridge the gaps between the different disciplines and thereby help the meat manufacturing sector to prosper.

References

Brody, A. L. (2007) Case-ready packaging for red meat, Food Technology, 61, 3, 70–2.

Fernández, A., Picouet, P. and Lloret, E. (2010) Reduction of the spoilage-related microflora in absorbent pads by silver nanotechnology during modified atmosphere packaging of beef meat, Journal of Food Protection, 73, 12, 2263–9.

Harrington, R. (2011) Trends in meat, poultry and seafood packaging, MeatProcess. com , accessed May 9, 2011.

Jaeger H, Reineke K, Schoessler K, Knorr D (2012) Effects of emerging processing technologies on food material properties. In: Bhandari B, Roos YH (eds) Food materials science and engineering, Blackwell Publishing Ltd., West Sussex, UK, 222-262.

Kerry, J. P., O'Grady, M. N. and Hogan, S. A. (2006) Past, current and potential utilization of active and intelligent packaging systems for meat and muscle-based products: A review, Meat Science, 74, 113–30.

MCmillin, K. W. (2008) Where is MAP going? A review and future potential of modified atmosphere packaging for meat, Meat Science, 80, 43–65.

Ozdemir, M. and Floros, J. D. (2004) Active food packaging technologies, Critical Reviews in Food Science and Nutrition , 44, 185–93.

O'Dowd LP, Arimi JM, Noci F, Cronin DA, Lyng JG (2013) An assessment of the effect of pulsed electrical fields on tenderness and selected quality attributes of post rigour beef muscle. Meat Sci 93(2): 303-309.

Sen, A.R., Muthukumar, M. and Naveena, B.M. (2013). *Meat Science-A Student Guide*. SATISH SERIAL PUBLISHING HOUSE, Delhi, India (ISBN: 978-93-81226-60-5).

Szerman N, Gonzalez CB, Sancho AM, Grigioni G, Carduza F, Vaudagna SR (2007) Effect of whey protein concentrate and sodium chloride addition plus tumbling procedures on technological parameters, physical properties and visual appearance of sous vide cooked beef. Meat Sci 76(3): 463–473.

Vaudagna SR, Sánchez G, Neira MS, Insani EM, Gallinger MM, Picallo AB, Gallinger MM, Lasta JA (2002) Sous vide cooked semitendinosus muscles: Effects of low temperature – long time treatments on quality characteristics and storage stability of product. Int J Food Sci TechnoL 37: 425–441.

Verbeke, W., Pérez-Cueto, F. J. A., de Barcellos, M. D., Krystallis, A., & Grunert, K. G. (2010) European citizen and consumer attitudes and preferences regarding beef and pork. Meat Science, 84, 284−292.

Chapter-8

CONCEPT OF FARM BUSINESS MANAGEMENT

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Introduction:

Animal Husbandry and Dairy Development sector plays an important role in the socio economic development of India. Besides providing low cost nutritional food to millions of people, it is helpful in generating gainful employment in the rural sector particularly among the landless labourers, small and marginal farmers and women by supplementing their family incomes. Livestock are the best insurance against the vagaries of nature like drought, famine and other natural calamities. They help in ploughing, sowing, threshing and carrying farm products. The Livestock Sector not only provides essential proteins and nutritious human diet through milk, eggs, meat, etc. but also plays an important role in utilization of non-edible agricultural by-products.

Agricultural Extension has been formally inducted as a major strategic intervention to improve the agricultural sector in India since 1952. The efforts put forth by the extension machinery during 1960s and 1970s have paid rich dividends. This resulted in four-fold increase in food grain production from 50 million tones to more than 220 million tones, through transformation of a large numbers of farmers. Similar results have been achieved in products such as milk, cotton, oilseeds, poultry etc. The results have established the possibility of development of an effective delivery system followed by building efficiency at farm level through the participation of millions of farmers.

Farming has been an enterprise undertaken by the farmers as a family vocation since ages. As such it has developed as a culture and a way of life for the farmers. But in the present context the efficiency of operation of the farms depends on various factors that are external to the farmer's system. The efficiency of the farmer in the present context not only demands the traditional knowledge of the farmers, but also the introduction of new products, new methods of production, newer markets, new type of inputs etc. The situation - demands new order of skills to be inducted among the farmers.

Farm Business Management will emphasize to assist farm families in meeting their business and personal goals through quality records and sound business decisions. Farm Business Management is designed to work closely with active, functional farmers and persons interested in farming as a business to assist farm families in meeting their business and personal goals through quality farm records and sound business decisions. Farm Business Management is designed to work closely with active, functional farmers and persons interested in farming as a business.

Though the efforts of the extension agencies are continuing over the years, a large section of the farming population in the present context remains to be improved. The complexity of the task is highlighted by the fact that more than 65 percent of farm households operate small and marginal farms. They have limited investment capacity, lack of credit worthiness, possess limited resources and fully dependent on the farm for their survival. Hence, in the present context, an urgent need is felt to improve the economy of the farmers through efficient farm planning and management.

Farm business management, as a concept, envisages that farming is undertaken by the farmer with the goal to achieve profit maximization from the resources at his/her command apart from meeting his/her family needs. This is irrespective of the type and the level of the farmer. The concept has three words the farm, the business and the management. Farm basically means the resource base that the farmer uses for his agricultural production activity. Business, on the other hand, refers to the economic activity that the farmer is involved in. All the farmers are involved in activities in the production of certain products leading to some economic benefits. However in the process, farmers in general due to their limited exposure, tend to face various doubts such as:

- How is my farm doing?
- Are the enterprise combinations proper? If not what needs to be done?
- Are the selected crops proper? If not what needs to be done?
- How do I select the crops or enterprises?
- What is the level of performance of my farm?
- What are the lacunae in the way it is being done now?
- What are the strengths of my farm?
- What else can I do to improve?
- What opportunities do I have?
- What risks I have to take?
- Are there any ways to avoid risk?
- How can I get higher profits in my situation?

All of these aspects need good management skills. As such, farm business management is crucial for any farmer to be successful on his/her farming activity.

Objective of Farm Business Management:

The basic objective of FBM is to ensure profit maximization for the farmers in the context they are operating. Since farming operations are specific to each farmer, irrespective of the variations the concept envisages some degree of profit maximization.

Process of FBM:

To achieve the objective of ensuring profit maximization for the farmers in their own situation, it becomes necessary for the extension worker to follow a systematic approach, as indicated below, to advise the farmers in improving their own situations. The following steps would be helpful in analyzing the existing situation and suggesting an appropriate strategy for farmer's improvement.

- Understand the basic concepts of farm, farmer and farm business.
- Assess the purpose of farming
- Assess the context of farming
- Understand the resource base of the farmer
- Understand the enterprises being undertaken by the farmer
- Analyze the performance of enterprises and the whole farm
- Undertake a SWOT analysis of the farm
- Suggest strategies to the farmer for improvement of farm business

5. Features of farm business management:

- Specific to each farmer
- Encompasses all enterprises of the farmer
- Profit maximization for the farmers is the objective
- Addresses the purpose of the farmers
- Built on the context in which the farmer is placed
- Focuses on achieving the objective through behavioral changes in the farmer
- The process involves bringing in changes in attitude towards farm business apart from building in knowledge and skills of the farmers
- Focus on the business aspects of the farm
- Involves all sectors and enterprises in its analysis
- Dynamic in nature, can be modified as per external and internal changes

- Is a tool for effective planning and implementation of farm development
- Can be easily understood and used by the extension personnel
- FBM is applicable to the individual farmers, groups of farmers, specific enterprises and to the farm organizations.

The Extension machinery has to educate the farmers to shift farming from production to business. The primary emphasis of Farm Business Management is to assist farm families in meeting their business and personal goals through quality farm records and sound business

References:

FAO (2006): "Farm Planning and Management for Trainers of Extension Workers". Training Materials for Agricultural Management Marketing and Finance, Published by FAO, Rome.

Farm planning, Rene Haveman, Terra Agric International BV, Dec 15, 2015

11 steps to a whole-farm plan, Raylene Nickel, 2/8/2018, Successful Farming Newsletters