

# LIVESTOCK, POULTRY AND FISHERIES DRIVING RURAL DEVELOPMENT & PROSPERITY

Indian livestock sector and poultry have evolved over the years into lucrative and rewarding enterprises for the farmers. An engine for rural prosperity, they have also played a cardinal role in ensuring nutritional security. Sometimes called as 'bank on hooves', dairy industry has emerged triumphantly in India as we are the largest producers of milk and we host the largest population of cattle in the world. Poultry sector too has emerged as a significant industry in India as many organized players have started their operations.





Once harnessed for draught power in agriculture, cattle also complemented the agriculture sector by way of organic manure supply. The livestock sector and poultry on the other hand supplemented the farm incomes handsomely. Mainly contained as a backyard activity, these sectors outgrew from the shadows of agriculture segment with the changing dynamics of Indian economy and demographics. Operation Flood and Cooperative

movement in dairy, spurred an unprecedented growth in the dairy segment. However, with the expansion of the industry, challenges such as scarcity of good feed, loss of traditional cattle breeds, inadequate infrastructure, contribution to global warming and outbreak of zoonotic diseases have rattled the sector.

#### **Daring Dairy**

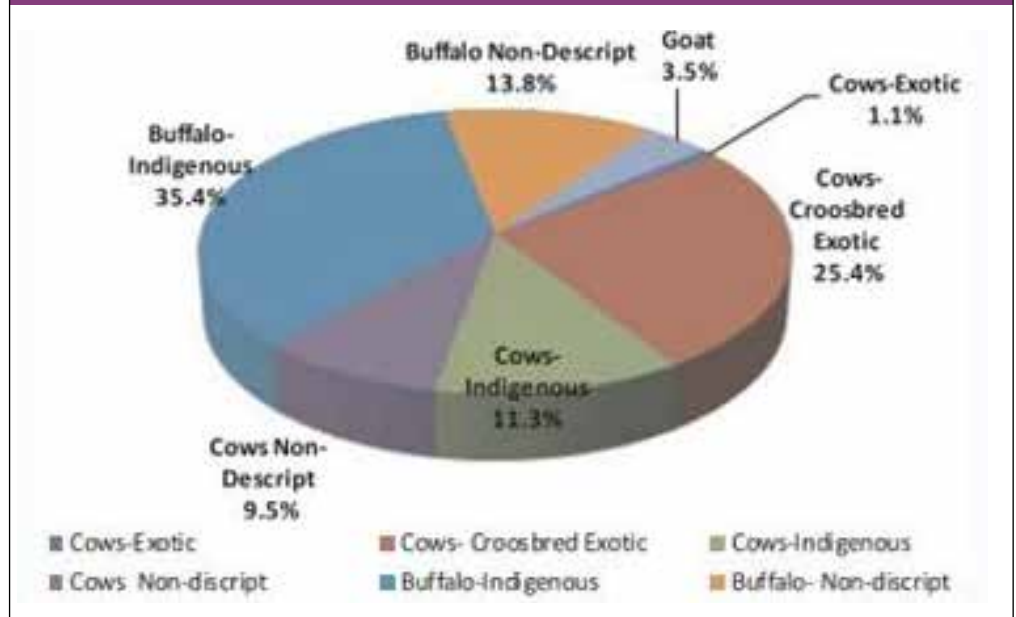
India is the world's largest producer of dairy products by volume, accounting for more than 13% of world's total milk production, and

it also has the world's largest dairy herd. India has 75 million dairy farms, about half of all dairy farms in the world. With only 2.29 per cent of the land area of the world, India is maintaining about 10.71 per cent of the world's livestock. The livestock sector contributed 4.11 per cent to the national GDP during 2012-13. According to latest livestock census, the total animal population was 512.05 million.

India's milk production has seen a phenomenal rise since fifties. During 1950-51, the milk production



## Species-Wise Milk Contribution in 2016-17



The milk production has increased from 155.5 million tonnes in 2015-16 to 165.4 million tonnes in 2016-17 registering a growth of 6.4%. This has also been reflected in the per capita availability of milk that rose from 130gm/day in 1950-51 to 355gm/day in 2016-17.

Milk in India is contributed mainly by cattle, buffalo and goat. Indigenous buffalo has the largest share closely followed by crossbred cattle

stood at 17 million tonnes. A slew of government initiatives and policies helped in increasing the milk production over the years. The milk production has increased from 155.5 million tonnes in 2015-16 to 165.4 million tonnes in 2016-17 registering a growth of 6.4%. This has also been reflected in the per capita availability of milk that rose from 130gm/day in 1950-51 to 355gm/day in 2016-17. Milk in India is contributed mainly by cattle, buffalo and goat. Indigenous buffalo has the largest share closely followed by crossbred cattle. The indigenous cattle contribute

11.3%, milk whereas non-descript cattle and non-descript buffalo contribute 9.5% and 13.8% respectively. Whereas, goat meekly donates 3.5% of the share. The milk production has registered an annual growth rate of 6.4%. Among the different states, Uttar Pradesh has the largest share of milk production in the country followed by Rajasthan.

The cooperatives and private dairies, handle around 25 percent of total milk production. This is further processed and marketed as packaged fluid milk and other value added dairy products. Dairy farmers sell around 60 percent of milk produced to the commercial value chain and unorganized dairies, while retaining 40 percent for household consumption. The cooperatives and private processors purchase milk from the farmers through their milk collection centers established close to the dairy farms at village level. The government estimates demand for milk to increase to 200 MMT by the year 2021-22, requiring a 20 percent increase in milk production.

India's processed dairy segment is also growing considering the increasing demand for packaged fluid milk and diversified dairy products. According to NDDDB, the total installed processing capacity of the dairy





cooperative sector is approximately 43 million liters per day, while the total registered processing capacity of private dairy sector is 73 million liters per day. According to industry estimates, around 70 percent of the processed milk is sold as fluid milk with the remaining used in manufacture of value added products. The packaged milk in India is mostly marketed as pasteurized milk in various variants depending on the fat content such as full cream milk (6 percent fat and 9.0 percent solid not fat (snf)), standardized milk (4.5 percent fat and 8.5 percent snf), toned milk (3.0 percent fat and 8.5 percent snf), double toned milk (1.5 percent fat and 9 percent snf) and skim milk (not more than 0.5 percent fat and 8.7 percent snf). Most of the private and cooperatives dairies do not have separate collection system for cow and water buffalo milk; therefore the packaged milk is mostly a mix of cow and water buffalo milk. However, there are a few dairy processors which also market exclusive cow milk. With rising health conscientious consumers, the demand for packaged milk is increasing. Similarly, the demand for ultra-high temperature (UHT) milk sold in aseptic packaging is rising owing to its long shelf life and perceived high quality. Consumption of value added dairy products are experiencing significant annual growth rates of around 15-20 percent. Products



such as dairy whitener, butter, ghee (clarified butter), paneer (cottage cheese), flavored milk, ice cream, cheese, yogurt, butter milk, and milk based sweets have been experiencing this growth trend.

Despite having the world's largest milk production, India is a very minor player in the international market due to high domestic consumption. Nevertheless, India consistently exports specialty products such as casein for food processing or pharmaceuticals. The major export destinations for the Indian dairy products are Bangladesh, Middle East, US and Egypt. India's dairy imports are insignificant. The major dairy product imports include milk powder, fats and oils, casein, butter, whey, cheese and lactose. The imports of milk powder and butter are irregular and depend on the domestic supply situation.

The government schemes such as "National Programme for Bovine Breeding and Dairy Development", National Dairy Plan (Phase-I) and



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"Dairy Entrepreneurship Development Scheme" have been helping to increase the profitability and productivity of the dairy segment. The restructured Scheme National Programme for Bovine Breeding and Dairy Development (NPBBDD) was launched by merging four existing schemes i.e. Intensive Dairy Development Programme (IDDP), Strengthening Infrastructure for Quality & Clean Milk Production (SIQ&CMP), Assistant to Cooperatives and National Project for Cattle & Buffalo Breeding with the budget provision of Rs.1800 crores for implementation during 12th Plan. Dairy Entrepreneurship Development Scheme (DEDS) was launched in September

2010 to promote private investment in the dairy sector to increase milk production in the country and create self-employment opportunities and, therefore, help in reducing poverty. This scheme is being implemented through NABARD, which provides financial assistance to commercially bankable projects with loans from commercial, cooperative, urban and rural banks. National Dairy Plan Phase I (NDP I) is a Central Sector Scheme for a period of 2011-12 to 2018-19 to help increase productivity of milch animals and thereby increase milk production to meet the rapidly growing demand for milk and to help provide rural milk producers with greater access to the organised milk-processing sector.



The livestock sector in India faces many challenges. Presently there is a big shortage of feed and fodder for this sector. The present shortage of feed and fodder in the country is as much as 40 per cent. According to IGFRI's estimates, by 2020, India will require 850 million tonnes of green fodder, 520 million tonnes of dry fodder (edible crop residue) and 90 million tonnes concentrates. The area dedicated to fodder cultivation has remained constant at 4.7 per cent of the total cultivable land since independence. Climate variations like increasing temperature and decreasing rainfall are reducing the yield of pastures and changing land use patterns, especially that of common and traditionally pasture

lands and is diverting a significant amount of the grazing pressure to forests.

Diseases are another important factor fiddling with the productivity of animals. Foot and Mouth Disease (FMD) alone leads to economic losses of more than Rs. 20,000 crore per annum. Most of these losses can be prevented through timely immunization. India has a total of 8,732 veterinary hospitals and polyclinics and 18,830 veterinary dispensaries against the requirement of about 67,000 institutions. Most of these have poor infrastructure and equipment. Livestock production also comes at an environmental cost. Though the sector contributes less than 2 per cent of global GDP, it produces 18 per cent of the global greenhouse gas emissions. In addition, the increasing geographic concentration of livestock production means that the manure produced by animals often exceeds the absorption capacity of the local area resulting in pollution. The Planning Commission also cites lack of credit for livestock farmers as a limiting factor for its growth.

### Prospective Poultry and Meaty Meat Industry

Intensely pursued as a backyard activity, today the face of poultry



**B Soundararajan**

Chairman of CLFMA of India

“In the next decade, nutritional security must be given top priority by the policy makers beyond just increasing food production and the livestock sector is poised to play a major role in it. The time has come for us to focus on holistic nutrition and health of the billion-plus population and make concerted efforts towards reducing malnutrition particularly among children. They are our future and we need to ensure they remain our top priority while making policies at the Central and State levels. Eggs are packed with essential nutrients and are one of the wholesome and healthiest foods especially for children. By including an egg in the mid-day meals every day, the problems of under-weight, wasting and stunting among school children can be addressed effectively. We are surprised as to why there are many other States that are yet to include eggs in their mid-day meal schemes. Animal protein (meat, milk and egg) is one of the easiest and most affordable means to achieve wholesome nourishment. They perfectly compliment plant proteins as our country has such a unique culinary heritage of over thousands of years that combine both vegetarian and non-vegetarian foods perfectly while not compromising health for taste or vice versa. While children that belong to the poorer sections of the society need nutritious diets, the wealthier ones need to be educated about healthy eating and balanced nutrition.”

is changing in India. Poultry is one of the fastest growing sub-sectors of animal husbandry; the annual growth rate of eggs being pegged around 6 per cent. India is the third-

largest egg producer after China and USA, and the fourth-largest chicken producer after China, Brazil and USA.

The egg production in the





country was 1832 million during 1950-51. There has been a steady increase in the production till 1999-2000. From then onwards, the production of egg increased substantially and reached 88139 million in 2016-17. From the per capita availability of 5 eggs per annum during fifties, it shot up to 69 eggs per capita in 2016-17. Among the

different states in India, Tamil Nadu is the largest contributor of eggs providing 18.0% of the egg production followed by Andhra Pradesh and Telengana contributing 18% and 13.4 % respectively.

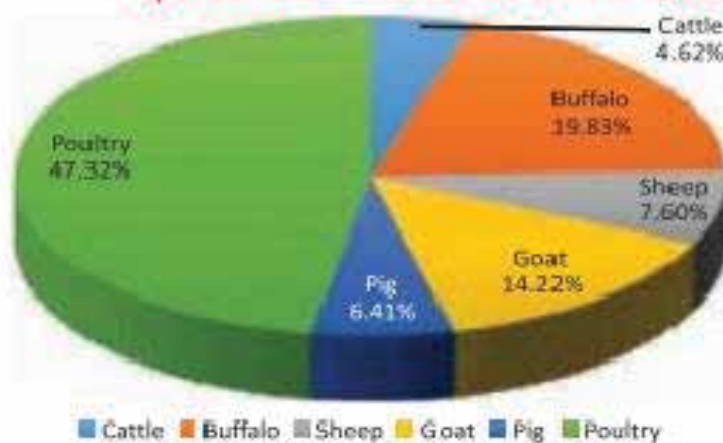
Poultry is the most organised sector in animal agriculture in India, worth Euro 14,500 million. Production of broiler meat has increased to 4.2 million tonnes per annum in 2015-16. Demand for processed chicken meat has been growing by 15- 20% per annum. Total layer production in India has gone up to reach 80 million eggs per annum.



In India, Poultry Production is spread among three segments: Layers, Broilers and Backyard / Family Production (Both eggs and chicken). 70% of the layer birds are being raised in the states of Andhra Pradesh, Telangana, Tamil Nadu, Karnataka, Maharashtra and Haryana. Broilers Feed (65%) and chicks (25%) account for 90% of the broiler inputs and consolidation is being observed in the market.

Smaller producers engage in 'contract farming'. At one time, 30% of the eggs produced in India were produced in the backyards. Improved varieties of 'Low technology input birds', which are dual purpose, i.e., producing eggs and meat, are new being bred in India for the purpose of backyard/family production. As per Agriculture and Processed Foods Products Export Development Authority (APEDA), India has exported 659,304 MT of poultry products for the worth of INR 7,680 million during 2015-16. Majority of the exports are destined for the Middle East. Each year, India exports around 5000 MT of poultry products into Europe, the largest chunk of which is

Species-wise Meat Contribution in 2016-17





destined for Germany, although the share of the Netherlands has grown significantly over the last few years.

A large group of poultry companies are based in and around Hyderabad. Andhra Pradesh and Telangana (erstwhile Andhra Pradesh) account for majority of the birds and eggs produced in India. Hyderabad in Telangana is the epicentre for the poultry industry in India owing to the presence of large producers as well as the existence of organisations such as the Directorate of Poultry Research (DPR), Indian Council of Agriculture Research (ICAR) institute and Indian Poultry Equipment Manufacturers Association (IPEMA). Sneha Foods Limited, Telangana; Srinivasa Hatcheries (SH Group), Telangana; Balaji Hatcheries, Andhra Pradesh; V S N Hatcheries, Andhra Pradesh; Mulpuri Group, Andhra Pradesh; Venky's (V H Group), Maharashtra; Suguna Foods, Tamil Nadu; R M Group, Haryana; Skylark Foods, Haryana; Komarla Group, Karnataka; I B Group, Chattisgarh and Bharati Poultry, West Bengal are some of the famous groups.

Rising incomes, urbanization, customer exposure have all played a pithy role in increasing the demand for meat in the country. The total meat production in the country for 2016-17 was pegged at 7.4 million tonnes. Cattle, Buffalo, Sheep, Goat, Pig and Poultry are the main meat contributors in India. About half of the meat produced in the country is contributed by poultry segment.

The highest annual growth rate of 7.87% was observed in 2012-13. However, the annual growth rate dropped to 5.21% for the year 2016-17. Among the different states, Maharashtra has reported the highest growth rate of 25%. Uttar Pradesh is the largest meat producing State in India contributing 18.23% to the total meat produced in the country. Maharashtra and West Bengal occupies the third position with 11.44% and 9.56% respectively.

However, the surging poultry sector is held back by several factors. The production facilities and methodologies followed by the poultry farmers in India are not in line with international standards. Open poultry farms with no climate control or quarantine mechanisms expose the birds to various potential diseases and epidemics and affects their productivity and profitability. Climate controlled farm houses, automated feed lines etc. can be a solution to this problem. Lack of storage, cold chain and transport have also affected the Indian poultry segment. More than 60% of broiler birds produced in India are produced in 6 states (Andhra Pradesh, Telangana Karnataka, Maharashtra, Punjab and), similarly more than 60% of eggs produced in India are produced in these six states and hence the poultry products have to be transported between the states. Birds are currently transported alive between the states, which causes them to be transported in inhumane and sometimes unhygienic conditions. Poultry produce neither are transported using refrigerated trucks nor are specialized equipment used for packing or transporting poultry

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in January, 2018. Experts suggest to segregate the country's poultry industry into separate zones to enable exports from other regions in case of outbreaks.

### Flourishing Fisheries

Indian fisheries and aquaculture have become an important economic activity catering to livelihood and nutritional security. Engaging about fourteen million people in different allied activities, this sector has been thriving due to India's diverse resources ranging from deep seas to lakes. Constituting about 6.3% of the global fish production, the sector contributes to 1.1% of the GDP and 5.15% of the agricultural GDP. The total fish production of 10.07 million metric tonnes presently has nearly 65% contribution from the inland sector and nearly the same from culture fisheries. India is home to more than 10 percent of the global fish diversity. Presently, the country ranks second in the world in total fish production with an annual fish production of about 9.06 million metric tonnes.

As the second largest country in aquaculture production, the share of inland fisheries and aquaculture has gone up from 46 percent in the 1980s to over 85 percent in recent years in total fish production. Freshwater aquaculture showed an overwhelming ten-fold growth from 0.37 million tonnes in 1980 to 4.03 million tonnes in 2010; with a mean annual growth rate of over 6 percent. Freshwater aquaculture contributes to over 95 percent of the total aquaculture production. The freshwater aquaculture comprises of the culture of carp fishes, culture of catfishes (air breathing and non-air breathing), culture of freshwater prawns, culture of pangasius, and culture of tilapia. In addition, in brackishwater sector, the aquaculture includes culture of shrimp varieties mainly, the native giant tiger prawn (*Penaeus monodon*) and exotic white leg shrimp (*Penaeus vannamei*). Thus,

produce.

Indian farmers mostly depend on soya bean and maize as the main feed. These help only in fulfilling minimum nutritional requirements, and do not help in raising high quality, healthy birds. There is shortage of quality feed in the market and lack of knowledge about the benefits of using quality feeds. Also, there are no quality standards in poultry farm management in India, prescribed either by the Government or by self-regulating industry bodies. For export market, APEDA has imposed strict quality standards and regular audits to ensure quality is maintained up to international standards. However, in the domestic market, there is a lack of comprehensive regulating authority to maintain hygiene in farms, processing and transportation. Licensing of farms is done on municipality level, who often lack the knowledge, expertise and human resources to strictly enforce quality standards.

There is a lack of dry processing capabilities in the Indian domestic poultry market. For lack of knowledge and awareness, Indian consumers prefer to go for freshly culled birds which are not processed in clean and hygienic conditions. Wet processing machineries pose serious environmental concerns owing to



poorly managed waste disposals. There exist limited storage facilities which can conserve the products without loss in quality. Processing machineries that are clean and hygienic, coupled with waste treatment plants are the need of the hour in Indian poultry market.

Disease outbreaks have also been the bane of the poultry segment. Owing to repeated outbreaks of the Avian Influenza virus, India's poultry exports have declined over the last two years. After sustaining above \$100 million for two years, exports declined to \$79.31 million in 2016-17. This year Saudi Arabia had imposed a temporary import suspension on all live birds, hatching eggs and chicks from India due to avian influenza outbreaks. This was in response to an outbreak reported from Bengaluru



### Naveen Chander, COO, Fish Chain

“Consumers have become increasingly aware of the relation between diet and good health, and hence the consumption of seafood products will most likely increase. The consumer recognizes that seafood is nutritious. Today’s consumer is changing rapidly. Instead of single-income households, it is increasingly more common to have both man and woman working. The size of the family is decreasing. As many as one-fourth of all households are occupied by one person. This means more shoppers and diners, most with little time for home preparation. The consumer demand for convenience, gourmet foods, and other services is increasingly evident in the food service and retail food industries. As the number of working women and single dwellers increases, the consumer base continues to change. With reduced leisure time, consumers who once spent two hours per day in the kitchen now spend less than a half hour. Convenience stores, fast-food restaurants, specialty food service outlets, and prepared items in the supermarket are food industry responses. Seafood, like other foods, will be placed in a competitive consumer environment. Fish and shellfish must continue to taste good if they are expected to attract more consumers. Further, seafood must stay within the budget of the new consumer. If the industry can respond to the changing consumer base, the opportunity to expand per capita consumption appears very positive. The processing, distribution and merchandising of Seafood will require more emphasis to reduced cost to be competitive in the market.”



from India, with 10.51 lakh tonnes in terms of quantity and Rs.33,442crores in value. This accounts for around 10% of the total exports of the country and nearly 20% of the agricultural exports. More than 50 different types of fish and shellfish products are exported to 75 countries around the world. The main challenges facing the fisheries sector include shortage of quality fish seeds, lack of resource-specific fishing vessels, reliable data, inadequate awareness about nutritional and economic benefits of fish and absence of standardisation and branding of fish products.

Livestock, Poultry and Fisheries play significant role in rural economic development and employment generation. Their profitability has been driving the growth of these very strong segments and has immense scope in the future.

the production of carp in freshwater and shrimps in brackishwater form the bulk of major areas of aquaculture activity. The annual carp seed production is to the tune of 25 billion and that of shrimp about 12 billion, with increasing diversification. Along with food fish culture, ornamental fish culture and high value fish farming are gaining

importance in the recent past. With over 2.4 lakh fishing crafts operating in the coast, six major fishing harbours, 62 minor fishing harbours and 1511 landing centres are functioning to cater to the needs of over 3.9 million fisherfolk.

Fish and fish products have presently emerged as the largest group in agricultural exports

# 'INDIAN POULTRY HAS UNDERGONE PARADIGM SHIFT IN STRUCTURE AND OPERATION'

SR Group, a growing conglomerate based in Hyderabad, Telangana was founded by Dr. A. Tirupathi Reddy and Dr. G. Ranjith Reddy after serving the poultry sector for over 6 years. Within a relatively short span of 20 years, the group has diversified into various activities such as the sale of Broiler Chicks, Poultry feed, Commercial Layer eggs, Broiler Hatching, eggs and Broiler live birds. The group boasts of being the highest seller of broiler chicks and poultry feed in South India and is also extensively penetrating into the Western and Eastern India markets. The group has also taken its operations abroad by entering the poultry industry in Uganda, Africa, as part of diversification into other industries. The poultry business forms the heart of the SR Group and is ever evolving. All the hatcheries under the SR Group maintain high levels of bio-security and hygiene. Known for the largest and expansive reach of chick sales, SR Group relentlessly strives to extend quality goods all over the country. In an interaction with Agriculture Today, Dr. G. Ranjith Reddy, M.V.Sc., Managing Director, S R Group, Hyderabad discusses the poultry segment in India and the challenges associated with it.



## How has the poultry segment in India evolved over the years? What are the major growth drivers of the segment?

The poultry segment has evolved from being a backyard activity to now being the third in the world Egg production and 4th in world Broiler meat production. The egg production is estimated to be 75 billion eggs and Broiler DOC placement is 3.5 billion per annum.

Indian Poultry industry contributes to about INR 90,000 crores to National GDP. The sector also provides direct and indirect employment to 3 million people in the country. India's agri based economy ensured the availability of raw materials for the growth of the poultry segment. Low water requirement when compared to agriculture, internationally known breeds with best performance and poultry technology development

such as top quality vaccines, latest equipment have positively influenced the Poultry growth and large scale expansion. Contract farming helped small farmers to take up broiler farming in integration model for a stable income, in addition to their agricultural income. Besides, poultry manure is used as organic fertilizer and a potential avenue for enhanced earnings.

### **Has India achieved self-sufficiency in the poultry segment? Can we meet the future demands with the current state of affairs?**

The Indian Poultry has undergone paradigm shift in structure and operation. Indian Poultry has grown largely due to initiative of private enterprises with huge investments in breeding, hatching, vaccine manufacturing, feed milling and equipment. India has developed its own pure lines from world renowned breeds by reducing dependency on imports. Now our productivity is at par with that of advanced countries. We have achieved self sufficiency in terms of production, but we have to strengthen our marketing system for further expansion to meet the future demands. Our per capita egg consumption is 68 eggs and Broiler meat is 3.8kg only against National Institute of Nutrition recommendation of 180 eggs and 11kg meat.

### **Use of antibiotics and hormones in the poultry segment has been a dampener. Can't the poultry industry do away with this practice altogether?**

Broiler bird is attaining a growth of 2 Kg in five weeks due to genetic engineering and best management practices. Disease incidence is very low due to standard preventive measures such as timely vaccination. Hormones are not at all used, and use of antibiotic is limited to treatment in emergencies only. Poultry Associations have always advocated judicious and responsible usage of all inputs including antibiotics. The media has great responsibility to ensure consumers are not misled by vested interests making untruthful claims without scientific data, as India still has malnourished population with protein deficiency.

### **How is the Indian feed industry poised to meet the demands of the poultry segment?**

Most modern poultry feed production units are established by top poultry players across the country for crumble/pellet feed. Also, latest technologies are used in the processing of feed. We are largely dependent on domestic production of agricultural commodities and watchful as our prices are aligned with global trends,

especially for key raw materials like maize and soya. The poultry sector has to adopt smart agricultural techniques to increase yield and to meet growing demand. Modern grain storage and processing facilities are the need of the hour. Our dependence on imported feed additives needs to be changed.

### **What is the level of processing in the poultry segment today in India?**

The current processing levels in Poultry are 9% which is sold as chilled, frozen and further processed out of 5.6 million tonne annual production of broiler meat. A growth rate of 18-20% is seen in processed chicken demand. Growth of chicken processing industry requires conscious phasing out of wet market with policy decision

### **What can other states learn from Telengana and Andhra Pradesh in poultry segment?**

Strong association activity during crisis management in situations like AI declaration and market coordination for implementation of movable price for Eggs and Live broiler birds have been the strong points of these states. Incentives from state governments in power tariff and releasing Maize or Cereals from MARKFED during short supply seasons has also helped in the growth of poultry segment.

### **What are the challenges associated with the poultry segment?**

Demand-Supply mismatch during seasonal consumption variations resulting in heavy fluctuation of prices is a big challenge for the poultry industry. A regulatory intervention is required to promote chilled or frozen chicken consumption. The government of India should stock eggs during lean seasons to help Layer farmers, as followed with most agricultural commodities. Vaccines for some prevalent diseases is the need of the hour. Another big challenge is the scarcity of raw materials when monsoon is not favorable. The government is not permitting the import of genetically modified raw materials is also a bottleneck. The presence of Poultry Board like NDDB is strongly felt especially for coordinating marketing of Poultry products.

# FODDER CONSERVATION THROUGH HAY MAKING

**D**airy is growing very fast, but our farmer is not moving with the same speed. The requirement of nutrients for obtaining high yield is very high, because of the expected high milk yield and environmental stress on the our dairy animals. The cheaper and easily available sources of nutrients to lactating animals are green fodder which is abundantly available in our farmer's field. But the major problem in today's dairy farming is that the supply of green fodder is not regular for the whole year. So, we have to develop different techniques in our dairy units to ensure that the nutrient product is available around the clock.

The cost of dairy farming especially for milk production is very high, if we are rearing animals alone on feed/grains. Dairy feed costs 70-75% and the green fodder's contribution is significant. Animal husbandry is an old business, but new techniques and research work can help in making this profession work better. The present number of cattle in Punjab is about 81.2 lakhs, which has 62.4 lakh big animals. There is a need for substantial increase in the current yield of green fodder to provide complete and good quality feed to the animals. One animal gets 30.65 kg of fodder per day, which is very low. If 40 kg of green fodder is found in a large livestock farm daily, then there is an annual requirement of 911 million tonnes of green fodder. Hay making not only conserves the abundant supply, but also ensures the regular supply of nutritious product for the whole year.

## Details about green fodder crops used for making hay

Fodder crop (legume)	Sowing time	Seed rate	Seed inoculation
Berseem	September (24-30) to October (1-7)	8-10 kg	Rhizobium
Lucern	Mid October	6-8 kg	Rhizobium
Cowpea	March to mid July	CL367= 12 kg	
Cowpea 88=20-25 kg	-		
Ryegrass	September(24-30) to October (1-7)	4 kg	-

## The nutritive value (on dry matter basis) of fodders (hay)

Fodder crop	Protein (%)	Total digestible elements (%)
Berseem	18.0	60.5
Lucern	22.0	59.5
Cowpea	22.5	61.2
Ryegrass	16.0	63.5



During November-December and May-June months, there is a severe shortage of green fodder for cattle which can be fulfilled by taking precaution or by applying silage. Dried green fodder is called as hay. In March-April, when there is an additional fodder of berseem, lucern or oats, it may be used for making hay. Various sources of protein and cereals are expensive. Legume crops such as berseem, lucern, guara and cowpea are very good for making hay. In addition to mineral and vitamins in dried legume fodder crops, protein is also available in good quantity, which is why it is important to dry the fodder used in ration. There is a special way to cut and store different fodder crops. Hay is made only from leguminous crops which are very rich in protein and minerals. Hay serves as a one important part of conservation of nutrients for use at the time of lean period.

The green fodder crops which are soft, are suitable for making hay, such as berseem, cowpea, lucern and ryegrass. The amount of moisture in green fodder crops is generally 80-90%, but in order to be able to store them, the moisture should be below 15. In March-April months, when berseem and lucern are ready for harvesting for fodder purpose in 20-25 days, and if these are not cut timely, fodder nutrients decrease. This is the best time to prepare hay and consequently the full use of the crop's nutrients. Hay making is very easy and the product obtained after this technique is very rich in protein, minerals and vitamins. Any farmer can easily adopt this technique. The only thing to keep in mind is the proper time of cutting, stage of cut and size of chaff fodder.

#### Indices of good hay:

Good hay color remains green in colour and the leaves and branches stay connected. This can be assessed by taking the material in the hands. If it feels dry, then hay is ready for feed and high nutrient is available in the hay. But in some cases, moisture content in the leaves as well as

#### The following are the important points of making hay (dry fodder):

- The fodder should be dried in the field for about 3 days.
- Chop 5-8 cm in size of green fodder crop.
- Spreadchopped fodder on a pucca floor and dry it in the sunlight in a set of 10-15 cm thickness.
- Stir the drying forage every 2-3 hours during the day to speed up the drying process under exposure to the sun and the air.
- By repeatedly stirring the fodder, it dries in 3-4 days.
- When thoroughly dry (usually) after 3-4 days, depending on the frequency of stirring, the intensity of the sun light and air movement of the air, gather the mixture of dried stems and leaves to store or market. When the leaves become cramped, carry the dry fodder up and store it.
- If dry fodder is easily broken, the amount of moisture is correct and it is ready to storage. Dried fodder can be stored in a chaff or strawed room. Normally drying green fodder reduces to 15-20% weight and 10-12% quality.
- Feeding of 10 kg of dry fodder on the basis of 85% dry matter is equivalent to feeding 35-40 kg green fodder. Feeding of animals with non-leguminous fodder, feeding with leguminous dry fodder, reduces the normal distribution of food.



branches is too high, then there is need of more drying for producing good quality hay.

Hay can be utilized during the shortage of green fodder. At the time of shortage of green fodder, there is excessive use of feed/ration which increases the cost of milk. Hay making is thus a unique initiative where we can conserve the green fodder by making it dry. This can reduce the cost of milk production

and increases the net profit of dairy farming. Every dairy farmer must start this new initiative in their dairy unit, so that balanced diet to the dairy animals can be maintained. Hay making also reduces the daily labour cost of harvesting and chopping. ■

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