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Livestock Processing Base Economy Role in Make in India - A Review

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***Abstract* – World's economy has recognized the potential contribution and impact of "Make in India" an initiative by Government of India. Efforts have been made to understand "Role of Animal and its contribution in Make in India". Interestingly, India is one of the world's top ranking and potential contributor of animal products, and by-products ranging from medicines to processed food, leather to scrap utilization and so on. Future potential employment, values and opportunities for entrepreneurs, and investor has been explored. Animal seems to play a vital role as a pivot point in growing Indian economy for years to come. It is next to impossible to oversee the animal role in Make in India.**

***Keywords* – Make in India, Animal Food, Role of Animal and Its Processing Industry, Rural Economy, Self Employment.**

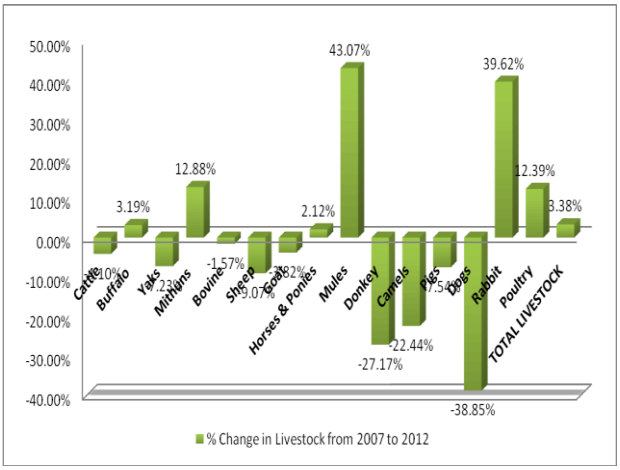
I. INTRODUCTION

India has become priority market for all domestic as well as international food processors. The livestock sector alone contributes nearly 25.6% of Value of Output at current prices of total value of output in Agriculture, Fishing & Forestry sector. The overall contribution of Livestock Sector in total GDP is nearly 4.11% at current prices during 2012-13 [5]. The progress in this sector is attributed the fact of increasing production of milk, egg, meat and wool, but also overall development of livestock by its diseases control, progeny development and related infrastructure etc.

Additionally, fisheries in India is a very important economic activity and a flourishing sector with varied resources and potentials. Only after the Indian Independence, has fisheries together with agriculture been recognized as an important sector. The vibrancy of the sector can be visualized by the 11–fold increase that India achieved in fish production in just six decades, i.e. from 0.75 million tonnes in 1950-51 to 9.6 million tonnes during 2012–13 [6].

As per Office of Registrar General of India (ORGI), the total livestock population in the country as on March 1, 2011 is 1210.2 million. The total Geographical area of the country is 3287240 sq km. The total livestock population consisting of Cattle, Buffalo, Sheep, Goat, pig, Horses & Ponies, Mules, Donkeys, Camels, Mithun and Yak in the country is 512.05 million numbers in 2012 [5]. Livestock population has increased substantially in Gujarat (15.36%), Uttar Pradesh (14.01%), Assam (10.77%), Punjab (9.57%) Bihar (8.56%), Sikkim (7.96%), Meghalaya (7.41%), and Chhattisgarh (4.34%). Change in livestock population from 2007 to 2012 has been depicted in Graph-1.

There are many opportunities to associate themselves with the value chain of processed food including animal byproducts intern encouraging Government of India initiative **"Make in India"**.



Graph-1: All India Livestock Census
Source: 19th Livestock Census

Animal byproducts like residuals, scrap, and offal (edible and non-edible) both processed and unprocessed has high demands as an inputs to various industries and products [8]. Handling these products is a low technical job and can be carried out easily has low qualification barriers. People can make money for better living (table-1).

Efficient utilization of by-products has direct impact on the economy and environmental pollution of the country. Non-utilization of animal by-products in a proper way may create major aesthetic and catastrophic health problems. Besides pollution and hazard aspects, in many cases meat, poultry and fish processing wastes have a potential for recycling raw materials or for conversion into useful products of higher value. Regulatory requirements are also important because many countries restrict the use of meat by-products for reasons of food safety and quality. By-products such as blood, liver, lung, kidney, brains, spleen and tripe have good nutritive value.

Waste products from the poultry processing and egg production industries must be efficiently dealt with as the growth of these industries depends largely on waste management. Treated fish waste has found many applications among with which the most important are animal feed, biodiesel/biogas, dietetic products (chitosan), natural pigments (after extraction) and cosmetics (collagen) Many developed countries consider everything produced by or from the animal, except dressed meat, to be a by-product. Animal by-products divided into two classes, edible and inedible. In United States terminology, offal means slaughter by-products, and includes the entire animal, which is not part of the carcass.

Waste in the food industry characterized by a high ratio of product specific waste. The utilization and disposal of product specific waste is difficult, due to its inadequate biological stability, potentially pathogenic nature, high

water content, potential for rapid auto oxidation and high level of enzyme activity. The diverse types of waste generated by various branches of the food industry on the respective level of production.

Table1: Value of output from livestock sector - at current prices (All figures are INR in crores)

S#	Item	2004-05	2008-09	2009-10	2010-11	2011-12	2012-13
1	**Milk Group**	123,907	194,993	228,683	269,363	310,021	349,672
2	**Meat Group**	31,259	54,848	66,663	82,093	91,121	106,605
3	**Eggs**	5,850	10,445	13,373	15,493	17,739	20,251
4	**Wool & Hair**	326	407	447	466	507	528
5	**Dung**	16,051	22,277	24,837	27,047	31,844	37,234
6	**Silk Worm Cocoons & Honey**	1,699	2,620	3,244	4,623	4,211	5,232
7	**Increment in Stock**	943	6,556	8,899	11,852	14,740	18,015
Value of Output from Livestock Sector		**179,709**	**291,739**	**345,699**	**410,471**	**469,676**	**537,009**

Source: AHS Series-15, Ministry of Agriculture and National Accounts Division, Central Statistical Office, M/O Statistics & Programme Implementation

The majority of the waste, in the meat industry is produced during slaughtering; waste includes bones, tendons, skin, and contents of the gastro-intestinal tract, blood and internal organs. These vary with each type of animal [10]. The specific amounts of generated waste for each type of animal are listed in Table-2.

Table 2: The specific waste index for slaughter houses with respect to the type of animal

Animal	Specific Waste Index[*1]
Cow	0.56
Calf	0.87
Pig	0.2
Sheep	0.1

[13]

[*1]Mass of accumulated waste divided by the mass of the saleable product

The mechanized slaughterhouses produce huge quantities of offal and digesta that could be profitably utilized for production of value added products, like Meat-cum-Bone Meal (MBM), Tallow, Bone Chips, Pet Foods and methane as a source of energy for value addition in most of the modern plants. MBM contains about 50% of good quality protein and is a cheaper source of protein for poultry feeding (Table-3). It is a good source of lysine and other sulphur containing amino acids.

Similarly, tallow is a cheap source of energy for broiler production vis-à-vis the vegetable sources which are expensive. Tallow is also used for soap manufacturing. The rendering plant cooks the byproduct at 133 degree Celsius at Bar 3, which completely sterilizes the MBM and destroys the prion causing BSE in the animals.

India has a large number of dogs and cats, which are kept as pet animals; however, there are only very few companies which have recently come forward for producing pet food. The international market is vast and demand of pet foods runs into billions of dollars. The slaughterhouses produce large quantities of raw material for pet food, which need to be commercially exploited.

Slaughter house waste is first converted into intermediate products like Meat Bone Meal (MBM), Di-calciumphosphate (DCP) & bicalphos (BCP) which are essentially feed supplements. They are then mixed with various crop ingredients to make a complete feed for animals. Meat Bone Meal is a protein and phosphorous supplements for animal feed manufacturers [2]. It is used up to 5% of total feed DCP and BCP are essentially phosphorous supplements for animal feed manufacturers and are used to the extent of 1% of total feed. Currently total production of MBM in India is around 55200 tonnes/annum and total estimated demand is 77500 tonnes/annum, so the gap between production and supply of MBM is around 22300 tonnes/annum. Similarly the total production of DCP in India is an around 27600 tonnes/annum and total demand is 34800 tonnes/annum. Therefore the gap between production and demand of DCP is approximately 7200 tonnes/annum [2]**.**

Table 3: Composition of Meat Cum Bone Meal (MBM)[1]

Oil	7 - 8%
Protein	50 - 52.0%
Fiber	3.00%
M.E. (K. Cal/Kg)	2500
Calcium	8.00%
Phosphorus	4.50%
Methionine + Cysteine	2.40%
Lysine	2.60%
Sodium	0.80%
Salmonella	Absent
Lesteria	Absent
E. Coli	Absent
Coliform Bacteria	Absent

Source: FAO UN

In general, meat is composed of water, fat, protein, minerals and a small proportion of carbohydrate. The most valuable component from the nutritional and processing point of view is protein.

Protein contents and values (Table–4) define the quality of the raw meat material and its suitability for further processing. Protein content is also the criterion for the quality and value of the finished processed meat products.

Table 4: Content of water, protein, fat, ash (in percent) and calories
(Approximate values for selected raw and processed food products)

Product		Water	Protein	Fat	Ash	Calories / 100g
FRESH	Beef (lean)	75.00	22.30	1.80	1.20	116
	Beef carcass	54.70	16.50	28.00	0.80	323
	Pork (lean)	75.10	22.80	1.20	1.00	112
	Pork carcass	41.10	11.20	47.00	0.60	472
	Veal (lean)	76.40	21.30	0.80	1.20	98
	Chicken	75.00	22.80	0.90	1.20	105
	Venison (deer)	75.70	21.40	1.30	1.20	103
	Beef fat (subcutaneous)	4.00	1.50	94.00	0.10	854
	Pork fat (back fat)	7.70	2.90	88.70	0.70	812
PROCESSED	Beef, lean, fried	58.40	30.40	9.20		213
	Pork, lean, fried	59.00	27.00	13.00		233
	Lamb, lean, fried	60.90	28.50	9.50		207
	Veal, lean, fried	61.70	31.40	5.60		186
	Raw-cooked sausage with coarse lean particles (ham sausage)	68.50	16.40	11.10		170
	Raw-cooked sausage finely comminuted, no extender	57.40	13.30	22.80	3.70	277
	Raw-cooked sausage (frankfurter type)	63.00	14.00	19.80	0.30	240
	Precooked-cooked sausage (liver sausage)	45.80	12.10	38.10		395
	Liver pate	53.90	16.20	25.60	1.80	307
	Gelatinous meat mix (lean)	72.90	18.00	3.70		110
	Raw-fermented sausage (Salami)	33.90	24.80	37.50		444
	Milk (pasteurized)	87.60	3.20	3.50		63
	Egg (boiled)	74.60	12.10	11.20		158
	Bread (rye)	38.50	6.40	1.00		239
	Potatoes (cooked)	78.00	1.90	0.10		72

The nutrient content of offal are iron, copper and certain B vitamins, with liver being a particularly rich source of vitamins A, B1, B2, B6, B12, niacin and pantothenate and even some vitamin C (ref. FAO).

Table 5(a): Composition of offal (per 100 gm raw)

Source		Protein	Fat	NA	K	Ca	Mg	P	Fe	Cu	Zn	Cl
		(% wet wt.)		(mg /100 gm)								
Brain	Calf & Lamb	10.3	7.6	140	270	12	15	340	1.6	0.3	1.2	150
Heart	Sheep	17.1	5.6	140	280	7	21	210	3.6	0.5	2.0	140
	Ox	18.9	3.6	95	320	5	25	230	4.9	0.4	2.0	95
	Pig	17.1	2.7	80	300	6	20	220	4.8	-	-	110
Kidney	Sheep	16.5	2.7	220	270	10	17	260	7.4	0.4	2.4	270
	Ox	15.7	2.6	180	230	10	15	230	5.7	0.4	1.9	200
	Pig	16.3	2.7	190	290	8	19	270	5.0	0.8	2.6	180
Liver	Sheep	20.1	10.3	76	290	7	19	370	9.4	8.7	3.9	93
	Ox	21.1	7.8	81	320	6	19	360	7.0	2.5	4.0	90
	Pig	21.3	6.8	87	320	6	21	370	21.0	2.7	6.9	95
	Calf	20.1	7.3	93	330	7	20	360	8.0	11.0	7.8	89
Sweetbread	Sheep	15.3	7.8	75	420	8	21	400	1.7	0.2	1.9	120
Tongue	Sheep	15.3	14.6	420	250	6	33	170	2.2	0.6	2.7	550
Tripe (dressed)		9.4	2.5	46	8	75	8	37	0.5	0.1	1.5	8
Lung	Sheep	17.9	2.7	-	-	-	-	180	6.4	-	-	-
	Ox	18.5	3.7	-	-	-	-	216	8.4	-	-	-
	Pig	15.2	1.9	-	-	-	-	-	18.9	-	-	-
	Calf	17.2	2.4	-	-	-	-	-	5.0	-	-	-

(Source: FAO, Lawrie 1981)

Kidney is a rich source of B1, B2 and B12: pancreas is a good source of B1, B2, C and pantothenate. The vitamin C in lungs, spleen and thymus is usually present in sufficient quantity to allow some to survive cooking.

Other organ meats compare well with lean meat as sources of the vitamins, and all meat products are good sources of zinc and of iron, liver, lungs and spleen being especially rich in iron [1]. Ears and feet have a high protein content but much of this is collagen and so of poor nutritional value, although when consumed this has no significant effect on the quality of the protein of the diet as a whole (http://www.fao.org/docrep/t0562e/t0562e02.htm).

Leather is one of the most widely traded commodities in the world. The leather and leather products industry plays a prominent role in the world's economy, with an estimated global trade value of approximately US$100 billion per year [3].

Leather can be made from cows, pigs, goats, and sheep; exotic animals such as alligators, ostriches, and kangaroos; and even dogs and cats, who are slaughtered for their meat and skin in China, which exports their skins around the world. Because leather is normally not labeled, you never really know where (or whom) it came from. (http://www.peta.org/issues/animals-used-for-clothing/leather-industry/)

Table -5(b): Composition of offal (per 100 gm raw)

Source		Thiamin	Ribo-flavin	Nico-tinic Acid	B6	B12	Folic Acid	Biotin	C	B	D	Retinol
		(mg)	(mg)	(mg)	(mg)	(µg)	(µg)	(µg)	(mg)	(mg)	(µg)	(µg)
Brain	Calf & Sheep	0.07	0.24	3.0	0.10	9	6	2	23	1.20	Tr	Tr
Heart	Sheep	0.48	0.90	6.9	0.29	8	2	4	7	0.37	Tr	Tr
	Ox	0.45	0.80	6.3	0.23	13	4	2	7	0.45	Tr	Tr
	Pig	0.48	0.90	6.9	0.29	8	2	4	5	0.37	Tr	Tr
Kidney	Sheep	0.49	1.80	8.3	0.30	55	31	37	7	0.45	-	100
	Ox	0.37	2.10	6.0	0.32	31	77	24	10	0.18	-	150
	Pig	0.32	1.90	7.5	0.25	14	42	32	14	0.38	-	110
Liver	Sheep	0.27	3.30	14.2	0.42	84	220	41	10	0.46	0.50	20,000
	Ox	0.23	3.10	13.4	0.83	110	330	33	23	0.42	1.13	17,000
	Pig	0.31	3.00	14.8	0.68	25	110	27	13	0.17	1.13	10,000
	Calf	0.21	3.10	12.4	0.54	100	240	39	18	0.24	0.25	15,000
Lung	Sheep	0.11	0.49	4.7	-	5	-	-	31	-	-	-
	Ox	0.11	0.36	4.0	0.07	3	-	6	39	-	-	-
	Pig	0.09	0.27	3.4	-	-	-	-	13	-	-	-
Pancrease	Sheep	0.13	0.50	3.9	-	19	-	-	18	-	-	nil
	Ox	0.14	0.34	3.1	0.20	5	-	14	14	-	-	nil
	Pig	0.11	0.46	3.5	-	7	-	-	15	-	-	nil
Spleen	Sheep	0.09	0.27	4.7	-	7	-	-	23	-	-	nil
	Ox	0.13	0.28	4.2	0.12	5	-	6	46	-	-	nil
	Pig	0.13	0.30	4.3	-	4	-	-	30	-	-	nil
Sweetbread	Lamb, Sheep	0.03	0.25	3.7	0.03	6	13	3	18	0.44	Tr	Tr
Tongue	Sheep	0.17	0.49	4.9	0.17	7	4	1	7	0.21	Tr	Tr
Tripe (dressed)		Tr	0.08	Tr	Tr	Tr	2	Tr	3	0.09	Tr	Tr

World population grew dramatically in the 20th century and it continues to grow at present. This growing population and the general increase in wealth have led to increases in the demand for meat, which in turn have kept the supply of leather raw material constant. The current predictions are that the supply of leather raw material will continue to grow in step with population growth [3]. These developments may generate tighter traditional supplies and raise the importance of such non-mainstream sources of raw material as camel, kangaroo and deer. Leather raw materials have increasingly become available in the developing world, while in the developed countries, a declining per capita consumption of red meat has reduced the supply of hides and skins. Now, more than half of the world supply of leather raw material comes from the developing world and, increasingly, those countries with large supplies are seeking to process them through to finished leather articles.

About 65% of all leather comes from bovine material and comes from the developed countries. The shift in raw material origins has prompted the industry to use more hides with surface defects [3]. Pigskin accounts for over 10% of all leather made currently in the world. China is now by far the dominant producer of pigskins and pigskin leather. Although the structure and fat - content of pigskin makes it very difficult to process [3]. Moreover, of all leather raw materials, pigskin is the one most closely connected with the food industry. Consequently, because

of cultural or cost reasons, the skin is often left on the carcass or used in the production of gelatin.

Very often, the countries with the fastest growing leather industries such as the Republic of Korea, Taiwan, China, Indonesia and Viet Nam have been facing shortcomings of internal raw material supply and had to import large quantities of hides and skins. Now, new tanneries are being set up in these countries in order to meet the growing demand for leather, while most tanners in Europe, Japan and the USA have closed down their facilities. This trend seems likely to continue. Tanneries that have remained viable in the developed world, in countries like Italy and Spain, have built clever business models, some of them entering into lucrative international alliances and others becoming what might be called "boutique units" with very high levels of creativity and quality [3].

On the other hand, many footwear businesses, even very small ones, have been able to adapt to the steep decline of shoe manufacturing in the developed countries by changing their structure and resorting to outsourcing or joint ventures. An important development has been the growing power of major brands and retailers, which makes the industry more demand-led than supply-driven.

Countries with good raw material supplies, such as India and Brazil, have continued to grow their industries successfully all the way to the finished product stage [3]. Increased costs in China have already created new opportunities for further development of the industry in Viet Nam, Indonesia, Bangladesh, and India. No country has the size or capability to replace China as industry leader, but these shifts have given a boost to many other aspiring nations.

Historically, about 65% of leather went into footwear, but this proportion has been decreasing lately toward 55% [3]. In 2008, for the first time, less than 50% per cent of footwear was made of leather. On the other hand, there has been growth in leather upholstery and other leather products, and leather has acquired new and innovative uses. The automobile upholstery sector has been exceptionally strong since around 1990.

There are now no sectors in which leather replaced by other materials, and the industry has to protect the image of leather products as synonymous with quality – both aesthetic and functional. For the last hundred years, chrome tanning has been the dominant method of making leather. Efforts made to find alternatives, and there has been some increase in the use of vegetable tanning of leather for footwear and other products. Non-chrome tanning methods have become quite popular with automobile manufacturers. Nevertheless, if well managed, chrome tanning remains the most efficient way to make leather. In many developing countries to achieve these goals, a great deal of assistance needed, as ultimate benefits are a very attractive proposition: high levels of employment in an industry that adds value to a high-quality renewable natural resource.

Nowadays animal-based medicine, which have been a part of therapeutic system of ancient medicines, have been a new frontier of research and development of new chemicals [9]. Animal products and by-products are also used in human medicines**.** The healing of human ailments by using therapeutics based on medicines obtained from animals or ultimately derived from them is known as Zootherapy. Despite their importance, as compared to plants studies on the therapeutic use of animals and animal parts have been neglected [14].

Aquaculture in India has evolved as a viable commercial farming practice and has been showing an impressive annual growth rate, while the carp-based freshwater aquaculture, mainly constituted by the Indian major carps, such as, catla, rohu and mrigal, has been contributing over 90 percent of the aquaculture production satisfying the domestic need, the shrimp-based coastal aquaculture contributes to only about 5 percent of the export earnings [6] (http://www.fao.org/fishery/ countrysector/naso_india/ en#tcN70176)**.** As the second largest aquaculture producer in the world, aquaculture in India is considered as a thriving sector for meeting the increasing fish demand in the coming years. The major carps, contribute the bulk of production to the extent of 70 to 75 percent of the total fresh water fish production and an immense scope for expansion of area exists under freshwater aquaculture [4].

The technologies of induced carp breeding and polyculture in static ponds and tanks virtually revolutionized the freshwater aquaculture sector and turned the sector into a fast growing commercial sector. The developmental support provided by the Indian Government through a network of Fish Farmers' Development Agencies and Brackish water Fish Farmers' Development Agencies and the research and development programs of the Indian Council of Agricultural Research (ICAR) have been the principal vehicles for this revolutionary development. Present concern is with regard to species diversification for available species, based on their regional importance.

Mariculture in India, although limited to the farming of mussels and edible oysters undertaken in some coastal region of Kerala over the years, has successfully produced sea cage farming in recent years, initially with sea bass and most recently cobia, which has shown the prospects of commercial mariculture in the country. The freshwater prawn farming has received increased attention only in the last two decades. The giant river prawn, *Macrobrachium rosenbergii*, the largest and fastest growing prawn species, is cultured either under monoculture or polyculture major carps.

Increasing desire for branded food as well as increased spending power. Large and distinct consumer brackets to support customised offerings, new categories and brands within each segment. Consumption in India is being driven towards the packaged and ready-to-eat foods. Favorable economic and cultural transformation and a shift in attitudes and lifestyles have consumers experimenting with different cuisine, tastes and new brands. There is an awareness and concern for wellness and health.

Processed food exports and related products have been rising steadily, the main destinations being the Middle East and Southeast Asia. India is a global outsourcing hub,

with large retailers sourcing from India owing to abundant raw materials, supply and cost advantages.

National Food Processing Policy aims to increase the level of food processing from 10% in 2010 to 25% in 2025.The National Mission on Food Processing and the Ministry of Food Processing Industries have launched a new centrally sponsored scheme in April 2012, for implementation through state and union territory governments. The basic objective of the National Mission on Food Processing is decentralization of the implementation of food processing related schemes for ensuring substantial participation of state and union territory governments.

To support schemes, various key provisions in the 2014-2015 union budget have been done. INR 500 Millions have been allocated for the development of indigenous cattle breeds and an equal amount has been set for starting a blue revolution in inland fisheries. Guidelines provide a lock-in period of eight years for use of assets in instances where deduction under Section 35 A of the Income Tax Act has been claimed.

This incentive provided for new units in the business of processing, preservation and packaging of fruits or vegetables, meat and meat products, poultry, marine or dairy products.

Here are the names of some of the key foreign investors in Indian Market [11]: Kraft (USA), Mars (USA), Nestle (Switzerland), McCain (Canada), Danone (France), Ferrero (Italy), Del Monte (USA), Kagome (Japan), Kelloggs (USA), Pepsi (USA), Unilever (Anglo Dutch), Perfetti (Italy), Cargill (USA), Coca Cola (USA), Hershey (USA)

II. Road Ahead

Further, the adoption of food safety and quality assurance mechanisms such as Total Quality Management (TQM) including ISO 9000, ISO 22000, Hazard Analysis and Critical Control Points (HACCP), Good Manufacturing Practices (GMP) and Good Hygienic Practices (GHP) by food processing industry, enable adherence to stringent quality and hygiene norms. Which also protect consumer health and prepare the industry to face global competition, enhance product acceptance by overseas buyers and keep the industry technologically abreast of international best practices [7].

III. Conclusion

Increasing population, urbanization and disposable incomes in developing countries are fuelling a strong growth in demand for animal food products. This will have a major impact on the location and organization of livestock production [12]. Changes in the latter will in turn strongly impinge on animal and human health, the livelihoods of the poor and the environment. Animal role in Make in India shall have following expected consequences:

- a major increase in the share of the developing countries in world livestock production and consumption;
- a gradual shift from cereals and other basic foods to meat and milk in the diets of developing countries;
- a change, varying in speed between regions, from multiple production objectives to more specialized intensive meat, milk and egg production within an integrated global food and feed market;
- increase in employment opportunities, development of small and medium scale industries to support large scale industry;
- development of supply chain management, PPP models, cold chain and sense of hygiene and food safety;
- rapid technological change and a shift to more industrial production and processing – cultural shift to good manufacturing practices;
- greater pressures on fragile extensive pastoral areas and on land with very high population densities and close to urban centers;

The future holds opportunities for animal production in developing countries like India. Small and medium scale industries shall be benefited by rendering support and ancillary services to large player. Though competitive rivalry shall benefit the masses by providing more economical, efficient and quality products within reach, On the other hand, if correctly managed, a dynamic livestock sector could prove catalytic in stimulating rural economies. However, if it is to take on this role, it will require proactive policies from the private and public sector, such as:

The removal of policy distortions that artificially increase economies of scale and disadvantage small-scale producers;

- building of institutional and infrastructural capacities to allow small-scale rural producers to compete and integrate successfully within the developing livestock industry;
- a conducive environment, through public sector investment where necessary, to allow producers to increase production through improved efficiency and productivity; and
- effective reduction of environmental, animal and human health threats.
- Guidelines, SOPs and good manufacturing practices for safe food for human consumption.

To ensure successful effectiveness and influence of **"Animal role in Make in India"** such proactive development policies has to be brought into effect to meet increased demand for livestock products on food security and safety, environmental protection and poverty reduction.

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