

LIVESTOCK REVOLUTION IN TROPICAL MONSOON COUNTRIES: SOME CHALLENGES AND ISSUES

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Abstract

Livestock revolution in tropical monsoon countries: some challenges and issues

Livestock husbandry is one of the important demand driven sectors of agriculture in the world. It acts as a global resource in the form of food, income, nutrients, employment, insurance, clothing and others purposes. It plays a vital role in socio-economic development of the farmers. Demand of livestock products is increasing on account of increasing population, changing food habits of the middle class population and urbanization in developing Asian countries. This paper seeks to understand the pattern of growth of livestock number as well as their products and to identify the issues and challenges emerged on account of dynamics in livestock husbandry in Monsoon Asian countries. By analyzing the recorded data of FAO (Food and Agriculture Organization) in different years paper enables to state that all species of livestock showed positive growth rate with the exception of sheep and pigs. Now the livestock husbandry showing the structural change i.e. in general it is shifting from horizontal expansion to vertical expansion in most of the study region. The livestock improved tremendously and achieved a great success in raising livestock derived products. Various issues and challenges of livestock husbandry are now deserved for academic and scientific discussion as a result of livestock revolution in world in general and tropical monsoon countries in particular.

Key Words

Livestock revolution, structural change, livestock issues

1. Introduction

Livestock sector is one of the very important sub sectors of agriculture in world. Their rearing is done in different ways following various forms of agricultural practices like traditional mixed farming, commercial dairy farming, and nomadic herding in distinct agronomic and socio economic conditions. Developed countries followed high level of commercialized livestock husbandry system with the objective to produce more and more dairy and meat products for meeting increasing demand in these countries. While the developing countries adopted the traditional form of livestock husbandry system with their multiple functions with a view to help in agriculture and enrich food nutrition at household level. Commercial oriented production was limited confined to some selected social groups and in peri-urban areas.

The dawn of 21st century witnessed an alarming growth in urban population, deregulation of agribusiness across inter-national boundary, increasing consciousness for health care with nutritive food and breaking of social and ethnic control on food habits in developing countries. These remarkable changes multiplied and augmented the demand for livestock derived food products tremendously over the decades. The demand for livestock products is estimated to be doubled by 2020 in developing countries (Conroy 2004, 1). A joint IFPRI/FAO/ILRI study suggested that global production and consumption of meat will continue to raise from 233 million metric tonnes (Mt) in the year 2000 to 300 million metric tonnes (Mt) in 2020, as will that of milk, from 568 to 700 million Mt over the same period. Egg production will also increase further by 30%.

Such trend of change in demand of livestock products in developing countries is described as livestock revolution. The tropical developing countries have good potential to augment livestock sector of economy and could meet world's increasing demand of livestock products like meat, milk and eggs in future. The tropical regions have been neglected mainly due to rather more attention on the food crop production for feeding burgeoning population especially in tropical monsoon Asian nations, African and Latin American countries. Traditional livestock husbandry persisted in tropical dry region as nomadic herding well in the past. So these regions may accelerate the livestock production and productivity by both horizontal and vertical expansion of this sub sector of agriculture. Study reveals as made earlier by scholars that the livestock sector has witnessed a structural change in geographical, sociological and economic aspects of livestock husbandry in world in general and Asian countries particular during last decades (Steinfeld 1998, 1). It shifted from temperate and dry agro climatic zones to tropical sub humid and humid regions, from ruminant domination to mono gastric livestock and from subsistence multi functions to mono function market oriented production system. Scaling up of production scale is also taking place from small livestock as household level to vertically integrated large scale enterprises controlled by capitalists/multi -national companies.

Tropical monsoon Asian countries experience mainly intensive traditional livestock husbandry as livestock cropping integrated system (Devendra 2004, 6-13). The growth of this sector at a commercial level, both ruminant and mono gastric livestock, undoubtedly, will affect the socio economic and ecological aspects in the monsoon region. Employment generation, income improvement, women empowerment, nutritional enrichment as well as poverty alleviation are the

important positive blessing which is expected by scholars from the development of livestock sectors. Simultaneously, there is another view concerning water, soil, air pollution, as well as social tension which may emerge after commercial intensification of the livestock sector in crop intensified agronomic dominant region of tropical world.

2. Purpose of the study

The present research work is aimed to

1. understand the pattern of growth of livestock number as well as their products in Monsoon Asia,
2. identify the issues and challenges emerged on account of dynamics in livestock husbandry.

3. Research methodology and data collection

The present work is mainly based on secondary sources of data. The earlier published literature is also used for understanding and developing the ideas regarding various aspects of livestock husbandry in tropical monsoon countries. The collected data are processed with simple statistical technique.

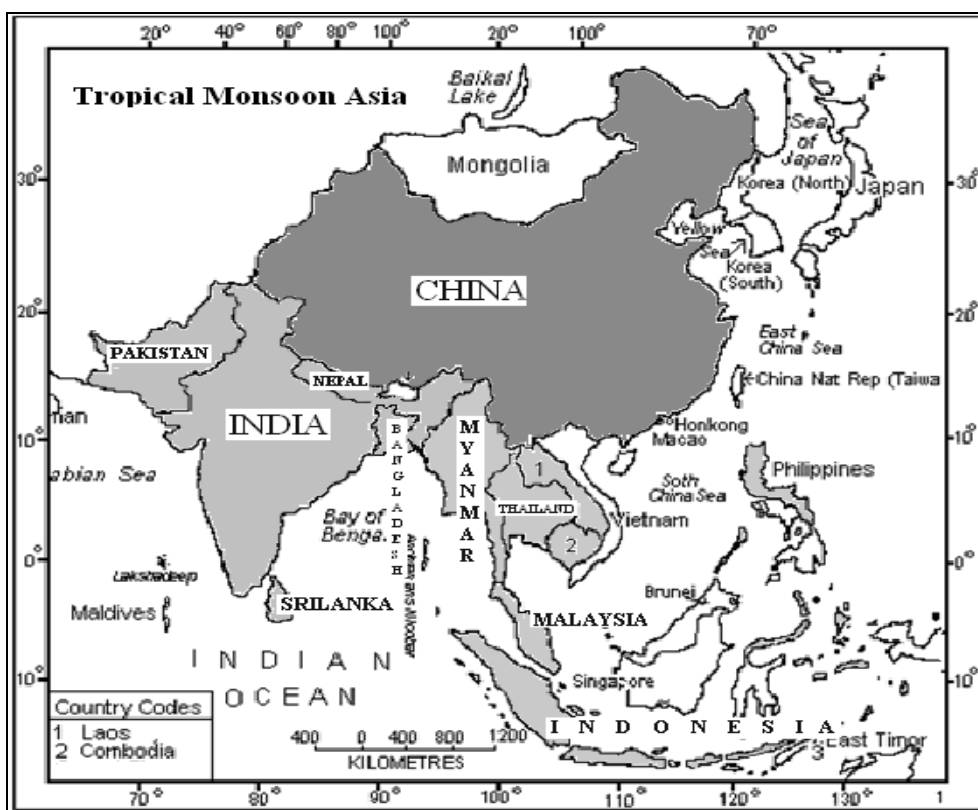


Fig. 1: Location map of the study area

4. Growth of Livestock Sector

The Tropical monsoon Asian region has high potential level for livestock development as it could not be harnessed on account of more stress on food crop production for feeding the high pressure of population in the area for centuries. The agronomic and socio economic conditions as well as saturation level of traditional cropping system opened livestock husbandry as new option for the farmers for earning their livelihoods. All species of livestock except sheep and pigs showed rather positive trend in their number and in their products. Among big ruminant cattle and buffalo witnessed amelioration during last decades. The analysis of growth rate during two period of times i.e.1991-2001 and 2001-2007, reveals that the cattle number grew up with slow rate in tropical monsoon region of the continent. It was 1.32% during 1991-2001 and 0.53 % annual growth 2001-07. This is because the giant cattle holding countries dropped the cattle heads. India exhibited negative trend at -2.79 % annual rates during the latter period as compared to 0.80 % during former period. China also showed the negative trend from 2.6 to -3.19 in cattle population during same period (Tab. 1). It is mainly attributed to the high level of mechanization of agriculture, low productivity of cows for milk production as well as prohibition of cow slaughter on religious ground especially in India (Khan and Iqbal 2008, 20-24). Changing preference for meat of mono-gastric livestock i.e. pork and poultry discouraged cattle rearing in CHINA and some other countries. Contrary to this Muslim countries like Pakistan, Bangla Desh, Malaysia and Indonesia, cattle showed positive growth as their meat and milk are preferred .Beef is highly demanded and accepted meat in these nations. Other ASEAN nations like Cambodia and Laos also improved their cattle heads rather at higher rate during 2001-2007 as compared to earlier decade as evident from table.

Tab.1: Percentage Change per year in Livestock during 1991-2001 and 2001-2007 in Tropical Monsoon countries.

Countries	Cattle		Buffalo		Sheep		Goat		Pigs		Total	
	1991-2001	2001-2007	1991-2001	2001-2007	1991-2001	2001-2007	1991-2001	2001-2007	1991-2001	2001-2007	1991-2001	2001-2007
Indonesia	0.5	0.41	-3.5	-1.25	2.1	0.52	1	2.31	-3.4	-1.97	-3.3	0.02
Malaysia	0.1	1.22	-2.3	-2.3	-5.2	-0.62	-4.7	3.26	-4.5	-1.33	-16.6	0.23
Myanmar	1.8	1.8	2	1.95	3.9	-1.64	3.6	9.3	5.3	-9.89	16.6	1.52
Thailand	-1.3	0.41	-11	-1.17	-14.7	-0.36	-1.5	19.26	5.2	-0.13	-23.3	18.01
Bangladesh	0.2	0.83	-0.1	6.54	2.3	0.32	0	7.7	0	0	2.4	15.39
India	0.8	-2.79	1.4	0.69	1.7	-0.17	0.8	0.22	3.5	2.85	8.2	0.80
Nepal	1.4	0.12	1.8	2.92	-0.9	0.32	2	3.02	4.8	-1.19	9.1	5.19
Pakistan	2.9	5.27	2.7	2.98	-1.7	-0.31	2.5	1.78	0	0	6.4	9.72
Sri Lanka	-0.1	-3.23	-2.2	-7.69	-6.9	-0.51	-0.4	-3.18	-2.8	-5.5	-12.4	-20.11
China	2.6	-3.19	0.3	-0.02	1.9	-2.04	5.4	0.22	1.6	0.9	11.8	-4.13
Cambodia	2.2	2.64	-2.4	3.37	0	0	0	0	1.7	-4.53	1.5	1.48
Laos	1.8	3.07	-1.3	1.58	0	0	8.1	-0.55	-1.9	-7.23	6.7	-3.13
Philippines	4.3	0.4	2.1	1.47	0	0	3.3	0.71	3.8	-3.09	13.5	-0.51
Average	1.32	0.53	-0.96	0.69	-1.34	-0.34	1.54	3.38	1.02	-2.39	1.58	1.88

Source: FAO 2002 and 2009.

Buffalo, the second important big ruminant, also exhibited an improving nature of growth in their head number. During the last decade of 20th century, their population declined with annual rate of -0.96% but the beginning decade of 21st century showed a tremendous improvement in buffalo rearing in tropical monsoon countries at 0.69% per annum growth. In SAARC countries like Bangladesh, India, Nepal and Pakistan, their numbers rose up at rather high rate. South East Asian

nations also have positive growth in the husbandry of same species. Goat, one of the small ruminants, number shot up at very fast rate in the study area, their annual growth rate was 1.54% during 1991-2001 and 3.32% during 2001-07. All the countries from this region excluding Sri Lanka, China and Laos witnessed remarkable changes / increase in goat number on account of increasing demand of mutton (meat) in monsoon countries due to high level of social acceptability among all religious groups unlike beef and pork. They are usually reared at household level by female members and poors who have small amount of capital to invest for big ruminants like cattle and buffalo.

Goat is considered as ATM and cows of poor and women in developing monsoon Asian countries. Their rearing is also preferred especially in Muslim families considering it as religious obligation as the most of the prophets reared goats in their lives. Besides the goats are also sacrificed every year by same community on the occasion of HAJ or EID-UL-AZHA in abundant number all over world (Khan 2008, 529-544). Sheep and swine rearing have been discouraged in the area on the ground of social and geographical conditions. The decline in common pastureland in all the countries due to increasing demand of land for cultivation of crops as well as less preference of lamb mutton led to the fall of sheep number in majority of countries of the tropical monsoon Asia. Swine rearing is unacceptable among Muslim dominated countries as their rearing, meat and any related items are strictly prohibited on religious ground. China and India are the only exception which has recorded positive growth in pig number during 2001-07 due to the fact the Chinese has good demand for pork internally. Trade of pig leather and its products in large scale from China is also one of the factors for increasing positive growth rate of swine rearing in China. The tropical monsoon Asia, however, is not well developed in livestock sector. Few countries i.e. Thailand, Bangladesh, Nepal and Pakistan exhibited growth in livestock sector at the rate above average (1.88%). Giant countries like India and China used either stagnation or decline in overall livestock number.

Tab. 2: Growth rate of Chicken Production during 1991-2001 and 2001-2007.

Country	1991-2001	2001-2007
1. Bangladesh	4.3	6.8
2. Cambodia	5.5	0.1
3. China	4.7	2.8
4. India	3.4	5
5. Indonesia	-0.8	9.9
6. Laos	4.6	8
7. Malaysia	4.8	7.4
8. Myanmar	6.7	17.7
9. Nepal	4.1	2.7
10. Pakistan	7.3	9.9
11. Philippines	4.9	2.4
12. Sri Lanka	2.2	3.6
13. Thailand	6.7	1.4
Total Average	4.32	6.03

Source: FAO 2002 and 2009.

Poultry is also showing growing rate during past two decades as it is exhibited by the Tab. 2. Its annual growth rate rose up from 4.32 % during 1991-2001 to 6.03 % during 2001-2007. All the countries of the region have shown more or less positive trend in poultry number. High level of social acceptability in all social and religious communities for poultry products is another cause of growing chicken population. This chicken meat is called as “universal meat” due to universal acceptance in all communities and religions. Besides, high rate of reproduction, quick return on capital investment, and small area requirement for their rearing are some of the major causes for fast growth rate of chicken. Myanmar exhibited an excellent record growth of 17.70% per annum during 2001-2007 against 6.7% per annum during 1991-2001. It is followed by Pakistan, Indonesia, Laos, Malaysia, Bangladesh and India. Thus positive change in poultry number is mainly attributed to increasing demand of poultry meat in Asian nations where 60% of world consumers resides.

4.1 Livestock Products

Livestock products are a source of protein and micronutrients, in which the poor are usually deficient. This could be alleviated by increased consumption of even small amounts of milk and meat, which provide the same level of nutrients, protein, and calories that a large amount of vegetables and cereals would provide (Iqbal 2010, 83-94). Various studies showed that the demand of animal products is increasing due to the increased demand of animal protein in developing countries and to cover the widening gap between projected demand and available supplies. The intensification in demand is attributed to the rapid population growth, inefficiencies in the management of the natural resources, changing consumer preferences, urbanization and increased disposable income (Devendra 2004, 6-13). To meet the demands, all the monsoon countries are in race of increasing population of livestock. Instead of this, these countries are facing shortage of animal protein. This situation is acute particularly in SAARC (South Asian Region) countries like India, Pakistan, Bangladesh, Nepal and Sri Lanka on account of increasing human population over the decades.

Tab. 3: Growth rate of milk production during 1991-2001 and 2001-2007.

Countries	1991-2001	2001-2007
Indonesia	2.5	1.45
Malaysia	2.5	-0.94
Myanmar	1.9	13.13
Thailand	15.2	8.30
Bangladesh	2.6	5.31
India	4.7	3.76
Nepal	2.8	2.79
Pakistan	6.4	3.22
Sri Lanka	0.9	-5.77
China	5.6	28.26
Cambodia	1.8	1.65
Laos	1.5	1.66
Philippines	-4.7	2.91
Total Average	3.361	5.05

Source: FAO 2002 and 2009.

However tropical Monsoon countries contributed a significant share to the world livestock and livestock products. Average growth rate of milk production, as it is

evident from the table 3, has increased from 3.36 % during 1991-2001 to 5.05 % during 2001-2007. All the countries except Malaysia and Sri Lanka showed positive growth during 2001-2007. The negative growth rate of Malaysia and Sri Lanka is attributed to the slow growth of big female ruminants like cattle and buffalo livestock for milk production during 2001-2007. Milk production from different species is differing from one region to another. But a large proportion of milk is produced from cows and buffalo. Regional analysis of annual growth of milk production during 2001-2007 indicates that China the most populous country recorded highest growth rate i.e. 28.26 %. It is followed by Myanmar, and Thailand. This vertical dynamics is also attributed to the increasing demand of milk for household consumption as well as processing units especially in China. While Myanmar and Thailand exhibited high growth due to increasing export of dairy products during post economic reform period.

The meat, highly demanded livestock products, exhibited positive trends during both points of time i. e. 1991-2001 and 2001-2007 at on an average 3.90 and 3.85 % annual growth (Table 4). But it is the most serious matter that annual growth rates in almost all countries with some exception have fallen. It is the reflection of rather inefficient productivity, unscientific management and weak extension service for development of meat production system in many countries of the region. Technological backwardness, lack of meat processing units, infrastructural facilities like refrigerated transport system and processing and marketing facilities have also resulted in meat production growth rate, though the demand for meat is rather high in and out of the region. Stagnation and negative trend in some livestock like cattle and sheep and prohibition of pig rearing in Muslim countries are other reasons responsible for rather slow growth during latter point of time.

Among the species, poultry meat production rose up rather higher rate than other meat like beef and mutton. It is highly demanded owing to its lower price, high social acceptability as well as its pro health nature.

Tab. 4: Growth rate of Meat production during 1991-2001 and 2001-2007.

Countries	1991-2001	2001-2007
Indonesia	0.1	5.59
Malaysia	3.6	2.03
Myanmar	6.6	28.23
Thailand	1.6	0.87
Bangladesh	3.4	-14.06
India	2	4.62
Nepal	2.8	2.31
Pakistan	1.7	4.18
Sri Lanka	4.8	4.96
China	7.1	1.16
Cambodia	4.6	2.35
Laos	6.5	2.93
Philippines	6	4.84
Total Average	3.90	3.85

Source: FAO 2002 and 2009.

Heart disease and sufferers from hypertension consumers are recommended for white meat i.e. poultry and fish. Proportion of such patients has been increasing tremendously over the decades. Buffalo and cattle beef grew up mainly in Muslim dominant countries where these are preferred meat. Swine (Pork) meat is concentrated with few countries like China and some countries of ASIAN groups of

monsoon region. Goat meat production improved up but its growth rate lies at third place in meat production hierarchy.

4.2 Structural Changes in livestock Sector:

Livestock sector developed from subsistence and nomadic herding to commercial and industrial form during long history of human civilization in monsoon countries. In general, livestock productions in tropical monsoon countries are increasing in response to technological development, market requirements and insufficient returns to the labor in traditional systems. Big ruminants (buffalo and cattle) and specially poultry production are developing from simple farm operation to complex vertical operation (Steinfeld 1998). Keeping in view the reduction of pasture and grazing land the choice of livestock production is also changing from big ruminants to small ruminants and chicken. It is also thought that grazing/pasture land in these countries in future will be limited, consequently poultry production will rise mainly due to the ability to convert feed efficiently into products.

Now the livestock husbandry in general is shifting from horizontal expansion to vertical expansion in most of the tropical countries. Livestock growth is decreasing in giant countries like in China, while the small countries show increasing growth rate. South East Asian countries are becoming hub for big ruminants. Among big and small ruminants, buffalo and goat respectively has the domination while among mono-gastric animal poultry has the domination. The traditional concept of livestock rearing in dry marginal areas is now shifting towards wet and agriculturally rich area. Thus the limitation of climatic effect to rear the livestock is now not a serious issue. In spite of livestock rearing alone, Intensive-crop-livestock integrated farming system is developing. The concept behind crop-livestock integrated farming system is the recycling of livestock products (dung manure) into farming and the farm products into the feeding of livestock. This is the economic approach which is widely accepted in all the tropical monsoon countries.

4.3 Livestock Husbandry and Socio Economic Change

With the revolution of livestock, societies evolve from subsistence agriculture into cash based economy as it play crucial role in economic growth of the people. This is the lone source of additional income for landless and small farmers. In all the countries particularly south Asian countries livestock husbandry has largest potential to flourish the society. The generation and health is improving up in many Asian countries due to intake of nutritious foods like meat, milk and eggs (Sugiyama 2003, 1-9).

Livestock plays an important role to eradicate poverty from the tropical Asian country. Among these tropical countries the largest numbers of poor people are found in India which reduced from 55% to 35% of the population from 1970 to 2001. Livestock husbandry is one of the major subsidiary sources of income of rural India.

Growth in livestock sector is important in many ways. First, by augmenting income and employment opportunities it would benefit millions of small landholders and the landless laborers who possess a sizeable proportion of livestock wealth. Thus, the growth in livestock sector is considered as an valuable tool to alleviate poverty. Second, increase in outputs of livestock would lead to increased consumption of livestock products, contributing towards lessening of nutrition deficiency disease. Third, acceleration in growth is reducing import dependence and facilitates export of

livestock products. Above all, being an integral part of agricultural economy, livestock would improve sustainability of the crop sector through provision of organic manure and draught power as inputs.

Moreover, Livestock husbandry is a small scale enterprise which has big potential for providing a gainful employment for rural women in their own household. Larger proportion of women's time is utilized in livestock husbandry in all the rural areas of tropical countries. Small ruminants like goat are mainly reared by women. So it is called as women's resource. The significance of livestock husbandry in empowerment process of the rural women could be evaluated with the improvement of livestock production with their empowerment of knowledge, skill as well as financial support.

5. Issues and Challenges

The livestock improved tremendously and achieved a great success in raising livestock derived products especially in developing countries of monsoon Asia. It appeared very helpful in filling the gap of demand and supply for livestock products in the recent years. But this revolutionary success occurred at the cost of environment, ecology, soils, water and genetic diversity in the region. Various issues and challenges appeared and deserve for academic and scientific discussion as a consequences of livestock revolution in world in general and tropical monsoon countries in particular.

Land and water use and availability are the most important issue in response to improving livestock husbandry and industrial sectors recently. The increasing demand for feedgrains and fodder crops have been reducing the availability of land for food crops cultivation which resulted in stress small size of landholdings owned by marginal and small farmers. The rise in livestock number and land index accelerated soil erosion in dry and mountain ecosystem on account of overgrazing. Besides, the consumption of water in the form of irrigation for feed grain production, Washing, cleaning the animals and their sheds as well as use in livestock derived product processing units could generate a crisis for water as the surface and underground water is depleting both quantitatively and qualitatively.

Atmospheric, water and soil pollution are another issues originated through intensification and scaling up of livestock husbandry. Bad unhealthy odour/smell from meat producing and producing units or places is very common event. Various lands of gasses such as carbon dioxide (CO₂), methane (CH₄), ozone (O₃), nitrous oxide (N₂O) and other trace gases (together forming greenhouse gases) affect the world's atmosphere, by contributing to "global warming" or global climate change. Livestock's contribution to that effect is estimated between 5 and 10 percent. Within this range, there are considerable problems in assigning emissions to single causes (Bolle, 1986, 157-203). It is produced as a by-product of the feed digestion of mainly ruminants and, on average, about 6 percent of the feed energy is lost in methane (U.S. Environmental Protection Agency, 1995). Mismanagement and unscientific method of disposal of livestock dung and urine in open space around water sources or near residential areas have also polluted surface water through run off waste mixed water and underground water through percolation of soluble wastes. Colour, odour, and chemical composition of water in many livestock slaughter area and near meat producing units have been observed and experimented.

Methane emission is the direct result of ruminants due to the consumption of large amounts of fibrous grasses and other feeds. This is the most aggressive greenhouse gas (320 times CO₂) contributing to global warming. Methane contributes about 25% of the greenhouse gases in which ruminant alone produce 20% of the methane (Priston 1990, 390-393). It is produced in animal manure which contributes about 0.4 million tons per year, or 7 percent of the total global anthropogenic emissions (Bouwman 1995).

Intensive generation of waste from poultry and swine units is the main polluter of surface and ground water in tropical Asian countries. In these countries particularly in India, Nepal and Pakistan dried dung are used as fuel in rural areas as well as in peri-urban areas which saves number of trees to be used as fuel. The ash produced after burning the dung cake is used as fertilizer in agriculture field. But this practice it contributes significantly in air pollution and much nitrogen goes up in smoke.

One of the most important products of livestock is its leather which is used to manufacture many sophisticated items. It contributes a large share in Indian economy. But the waste from leather production is most hazardous for the soil as well as for water. In leather production hydrogen sulphide and the most toxic component i.e. chromium is used to make the hides resistant to bacteria and temperature which is very dangerous for the water quality, fish and other aquatic life. When this water is applied to the land, the ground water as well as the productivity of soil is badly effected. It is so dangerous that the land may become infertile.

Moreover the revolution in the form of vertical integration and scaling up, the survival of millions of small livestock holders is at stake. Their scale of economy and traditional form of livestock rearing with small capital and limited land capital could not be competitive with large scale capital intensive high-tech oriented multinational companies involved in the same farming system. It may led to soci-economic crisis in developing monsoon countries where landless, marginal and small farmers are found in the largest proportion not less than 90% together.

6. Conclusion

Livestock husbandry in tropical Asian countries developed well with the variation of species and time. Various kinds of livestock species like cattle, buffalo goat, sheep, pigs, hen, etc. are reared as domestic and subsistence animals. All species showed positive growth rate with the exception of sheep and pigs. Livestock are now reared for income generation and serve as long term savings. Goat are reared at households level and needs very less investment and give short term quick output which is act as the semi annual income. While chicken among mono-gastric animal, showed high growth rate because of the large consumption by all the communities in theses tropical countries.

Growth rate of cattle increases with very slow rate. it grew up at 1.32 % per annum during 1991-2001 while during 2001-2007 it was 0.53 %. This is because the giant cattle holding countries like India and China dropped the cattle heads per year. This is also due the high level of mechanization of agriculture, low level of milk production from cows and prohibition of cow slaughter on religious background particularly in India, changing preference of meat.

Buffalo one of the big ruminants contributed a large share in livestock number and showed tremendous improvement in their number in the beginning of 21st century. While goat, the poor's and women's ATM showed amelioration during these two decades due to highly acceptability among all social and religious group in tropical monsoon countries. However swine and sheep have been discouraged and much declined during 2001-2007 on the ground of social, religious and geographical conditions. Moreover, poultry number also showed a tremendous increase during the latter decades. This is attributed to the universal acceptability in all social and religious groups.

Tropical monsoon countries contributed a significant share of livestock products due to increasing demand of the world population. The growth rate of milk increased from 3.36 % to 5.50% during 1991-2001 to 2001-2007. China recorded largest growth rate followed by Myanmar and Thailand due to increasing demand of milk for household consumption and availability of processing units in China.

Cows milk shares the highest growth rate i.e. 9.87% during 2001-2007 as compared to buffalo milk share only 3.63 %. This shows the widely acceptability and rearing of tropical monsoon countries. Similarly, meat also exhibited positive trend of growth during both points of time i.e. 3.90 and 3.85%. But with the exception of some countries it fell down in all the countries. Goat has the highest share of meat production followed by mutton/lamb and poultry due to highly acceptability of goat meat in the entire social and religious group. Thus it is an important source of food security as it provides meat and milk and other dairy products, which enrich the nutrition intake.

However, the Vertical and horizontal structural changes in livestock husbandry occurred in recent decades owing to increasing demand of livestock and their products. It changed from backyard/ household traditional nature of livestock husbandry to an industrial form with rather large size of livestock holding/keeping. Now the concentration of livestock farming and industries have been also shifting from rural to peri-urban and urban areas where demand intensity for livestock derived products is very high. Study reveals that locational shifting has been also very interesting dimension of dynamics of livestock rearing sector. The traditional concept of livestock rearing in dry marginal areas is now shifting towards wet and agriculturally rich area. Thus the limitation of climatic effect to rear the livestock is now not a serious issue.

Moreover, Livestock husbandry is a small scale enterprise which has big potential for providing a gainful employment for rural women in their own household. This is the lone source of additional income for landless and small farmers. In all the countries particularly south Asian countries livestock husbandry has largest potential to flourish the society. Thus the growth in livestock is significant for augmenting income and employment opportunities and alleviates poverty, contributing towards lessening of nutrition related problems, reducing import dependence of livestock products, and as a source of improvement in sustainability of the crop sector through provision of organic manure and draught power as inputs. But this success is achieved at the cost of decline in environment sustainability, ecological suitability, genetic diversity, and the various kinds of potential of diversification of farming systems.

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LIVESTOCK REVOLUTION IN TROPICAL MONSOON COUNTRIES: SOME CHALLENGES AND ISSUES

Summary

Livestock husbandry is one of the important demand driven sector of agriculture in world. It plays a vital role in socio economic development of farmers through the generation of employment and income as well as addition to their food intake. Demand for livestock derived products is increasing on account of increasing population, changing food habits of middle class income groups and swallowing of urban population in developing countries. The paper seeks to understand the pattern of growth of livestock number as well as their products like milk and meat, and to identify the issues and challenges emerged on account of dynamic in livestock husbandry in Monsoon Asian countries.

Livestock husbandry in tropical Asian countries developed well with the variation of species and time. Various kinds of livestock species like cattle, buffalo goat, sheep, pigs, hen, etc. are reared as domestic and subsistence animals. All species showed positive growth rate with the exception of sheep and pigs. Livestock are now reared for income generation and serve as long term savings. Goat are reared at households level and needs very less investment and give short term quick output which is act as the semi-annual income. While chicken among mono-gastric animal, showed high growth rate because of the large consumption by all the communities in these tropical countries.

Growth rate of cattle increases with very slow rate. it grew up at 1.32 % per annum during 1991-2001 while during 2001-2007 it was 0.53 %. This is because the giant cattle holding countries like India and China dropped the cattle heads per year. This is also due the high level of mechanization of agriculture, low level of milk production from cows and prohibition of cow slaughter on religious background particularly in India, changing preference of meat.

Buffalo one of the big ruminants contributed a large share in livestock number and showed tremendous improvement in their number in the beginning of 21st century. While goat, the poor's and women's ATM showed amelioration during these two decades due to highly acceptability among all social and religious group in tropical monsoon countries. However swine and sheep have been discouraged and much declined during 2001-2007 on the ground of social, religious and geographical conditions. Moreover, poultry number also showed a tremendous increase during the latter decades. This is attributed to the universal acceptability in all social and religious groups.

Tropical monsoon countries contributed a significant share of livestock products due to increasing demand of the world population. The growth rate of milk increased from 3.36 % to 5.50% during 1991-2001 to 2001-2007. China recorded largest growth rate followed by Myanmar and Thailand due to increasing demand of milk for household consumption and availability of processing units in China.

Cows milk shares the highest growth rate i.e. 9.87% during 2001-2007 as compared to buffalo milk share only 3.63 %. This shows the widely acceptability and rearing of tropical monsoon countries. Similarly, meat also exhibited positive trend of growth during both points of time i.e. 3.90 and 3.85%. But with the exception of some countries it fell down in all the countries. Goat has the highest share of meat production followed by mutton/lamb and poultry due to highly acceptability of goat meat in the entire social and religious group. Thus it is an important source of food security as it provides meat and milk and other dairy products, which enrich the nutrition intake.

However, the Vertical and horizontal structural changes in livestock husbandry occurred in recent decades owing to increasing demand of livestock and their products. It changed from backyard/ household traditional nature of livestock husbandry to an industrial form with rather large size of livestock holding/keeping. Now the concentration of livestock farming and industries have been also shifting from rural to peri-urban and urban areas where demand intensity for livestock derived products is very high. Study reveals that locational shifting has been also very interesting dimension of dynamics of livestock rearing sector. The traditional concept of livestock rearing in dry marginal areas is now shifting towards wet and agriculturally rich area. Thus the limitation of climatic effect to rear the livestock is now not a serious issue.

Moreover, Livestock husbandry is a small scale enterprise which has big potential for providing a gainful employment for rural women in their own household. This is the lone source of additional income for landless and small farmers. In all the countries particularly south Asian countries livestock husbandry has largest potential to flourish the society. Thus the growth in livestock is significant for augmenting income and employment opportunities and alleviates poverty, contributing towards lessening of nutrition related problems, reducing import dependence of livestock products, and as a source of improvement in sustainability of the crop sector through provision of organic manure and draught power as inputs. But this success is achieved at the cost of decline in environment sustainability, ecological suitability, genetic diversity, and the various kinds of potential of diversification of farming systems.