CHAPTER - VII

Role of Women in Enhancing Household Food Security through Livestock Products

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Objective:

i) To estimate the impact of livestock enterprise in livelihood sustainability.

ii) To study the role of women in enhancing household food security through livestock products.

Hypothesis – There is significant relationship between improved livestock management and production activities and livelihood sustainability.

7.1. IMPACT OF LIVESTOCK ENTERPRISES ON LIVELIHOOD SUSTAINABILITY

Concept of sustainability has several dimensions – socio-economic, cultural and environmental. Depending upon the stage of development of scientific agriculture, extent and quality of natural resources, resource based of the farming community, intensity of biotic pressure etc., sustainability has different meanings for different socio-economic strata in the developed and developing countries. It is a complex concept which is generally seen as human centred, long term and involving interaction with natural system. Therefore, livelihood sustainability is intrinsically linked with socio-economic condition of a particular community, tribe or any social group. The question of gender equity is also invariably linked with livelihood sustainability. The other dimensions of sustainability are culture and environment. As livelihood sustainability is inherently related with production system, therefore economic and ecological indicators need to be paid equal weightage while planning the land use pattern. Many a time agricultural production systems are optimized for benefiting the human population at the cost of renewal or recycling ability of the natural system resulting in a unsustainable situation. The livestock enterprises are in many ways dependent on agriculture production system and hence its impact on livelihood sustainability needs to be studied with wide

perspectives of farming system prevailing in a particular geographical location and the interacting community.

Livelihood system of a household in rural location may be dependent on handicraft, off-farm employment and farming system. Farming system generally consists of livestock system and cropping system – the former creates the animal environment, while the latter farms the plant environment. The animal environment is solely dependent upon plant environment. Hence any change in plant environment impacts the animal environment.

It needs no mention that livelihood of a community is influenced by both animal and plant environment as goods and services needed by it are derived from both animals and plants. Thus, food consisting of plant and animal protein and calories consumed by humans are supplied by agro-ecosystems which are the living communities of soil, plants and animals that constitute our farms, croplands, orchards, pastures and range lands. It is worthwhile to mention that more than 90percent of all crops and livestock we consume as well as livestock feed is produced by agro-ecosystems. In the agro-ecosystem approach of agricultural development there exists constant interaction of different components where social and economic consideration receive priority and people are at the centre of such agro-ecosystems.

The four parameters of agro-ecosystems are productivity, sustainability stability and equitability. To analyze the sustainability of an agro-ecosystem or the livelihood of the community within it requires a reference to all possible variables and their interactions, a task made possible only by a process through which the major or priority issues and interactions are identified by a community of end users and other participants appropriate to the level of reference.

Agro-systems are of different types seasonally cropped systems, permanently cropped system, Forestry system, Aquaculture system and irrigated agro-systems. In the present case the agro systems of Goalpara district comprises of the mixture of two or more of phase types of ecosystems.

The Indian council Agricultural Research (ICAR) identified eight major agro-ecological regions in India for more meaningful planning of agricultural research and

development. Out of these the humid Bengal-Assam Basin evening west Bengal and Assam represent the Gango-Brahmaputra alluvial plain. The Goalpara district, the study area, is the westernmost part of Assam and experiences hot humid monsoonal climate. Topographically, the district is almost flat plain except for few low forested hills that break the monotony of the terrain. There exists a large number of char (riverine tracts and sandy river island) in the Brahmaputra River. Agro ecologically the district falls under the lower Brahmaputra valley zone. Soil of the district is acidic in reaction and sandy to sandy loam in texture. Climate is sub-tropical with average maximum temperature of 35-38^{0}C in summer and minimum temperature of 7-10^{0}C in winter. Average rainfall is 228.7 mm.

The district experiences flood of moderate to severe intensity during monsoon. Besides, the district also witnesses flash flood. While 20 percent (36,503 hactre) of the district is under forest coverage, the net cropped area is 83,502 (45.76percent) hectares .while gross cropped area in the district is 1,39,448 hactres with cropping intensity is 167 percentage. The barren uncultivable area in the district is 32,819 hactres (17,98percent). On the other hen only 36,44 percentage of agricultural land in the district is under irrigation.

Economy of district is primarily agrarian. However only 18.34 percent of the population is directly engaged in agriculture and there is a total of 108230 farm families and 43015 landless farmers.

Majority of the farm families are marginal farmers. Agro forestry is the unique practice in the district. Almost every household grows timber plants as a source of cash. Arecanut and banana are the major cash crops in the district. The major agricultural produce are rice, jute, green gram, black gram and wheat. Major horticultural produces are banana, jack fruit, arecanut and rabi vegetables. Most of the households keep livestock like cattle, goat, pig and poultry including duck, and fowl in their homestead. Most of the families have a fishpond near their dwelling houses.

With the advent of Green Revolution high yielding modern farming system have also appeared in this district and amazing ability of human beings to adapt and control the agro-ecosystem has succeeded in removing or diminishing the limitations nature has

put on productivity. Thus, more favorable conditions of crop growth have dramatically increased the productive potential. But along with these new production technologies the synthetic fertilizers and insecticides and pesticides appeared on the scene. Due to population explosion agricultural land has begun to shrink prompting more use of such synthetic fertilizers and pesticides. Therefore, environmental threat has become a reality. Consequently, the slowdown in agricultural output has been witnessed due to several factors and the land is becoming unable to support the burden of intensive agriculture. Land, water and biodiversity are being damaged increasingly. The impact of intensive agriculture an environment can be local which includes erosion, loss of soil and increase in sedimentation in the local rivers.

The recurrent floods and soil erosion in the district has rendered unsustainability in the livelihood of rural people to certain extent. During 2019-2020 crop damage due to flood and other natural disasters amounted to more than Rs.67 crores.

In intensive agricultural production system, a significant portion of nitrogenous fertilizers leaches through the ground water and increases the nitrate concentrate of ground water. When such water is used for drinking, diseases like methemoglobinemia and cancer may occur. Moreover, intensive agriculture without proper care is responsible for depletion of soil nutrients. By indiscriminate use of fertilizers and pesticides soil microbial activity is affected. Soil structure is strongly affected in the long run by changes in climate, biological activity and soil management practices. Some other problems arising out at intensive agriculture are soil salination, soil deterioration due to accumulation of salts and soil acidification etc. Entry of pesticide residues in food chain has created threat to human health. Under such circumstances livelihood sustainability of agriculture dependent people has been greatly affected. Moreover, it has been realized that income through arable farming has been proved to be insufficient for marginal and small farmers which constitute about 62.46 percent of the total farm families in the district. This has increased the necessity of alternative agriculture which encompasses a broad range of agricultural system that are alternative to present common practices and provides an opportunity to increase economic gains per unit area per unit of time. Thus, it fits well with farm level infrastructure and ensures judicious utilization of available resources and by-products and thereby reduces the drawbacks of present-day intensive

agriculture and enhances its sustainability and the livelihood system of the people. Its main objective is to make agriculture economically and ecologically sustainable. The emphasis is on two dimensions i.e. time and space. This minimizes the risk and increases the production with better utilization of resources like waste and residues. Therefore, activities like livestock rearing poultry keeping, aquaculture, beekeeping, sericulture and agro forestry assume significant importance. It goes without saying that livestock and poultry enterprise can provide on all the year round income to the people and the byproducts of agriculture and horticulture can be better utilized. The natural calamities like flood, draught, hailstorm etc. create havoc among farming community which receive rescue with the keeping of livestock. The shrinkage of land size due to population explosion causes no problem for small animal keeping and poultry farming. The inter dependency of crop enterprise and livestock production system is an age old practice. The productivity of livestock is controlled by three principal factors –genetic makeup, environment including nutrition and disease and their interaction.

If livestock production is to be made sustainable, it should have four major qualities – viz. economic viability, technical feasibility, social acceptability and relevant resource based. Backyard farming in this district is an age old practice with its proven economic viability and technical feasibility. The local germplasm of Doom pig, Lakhimi cattle, pati duck, desi Fowl and Luit buffalo are the mentionable resource base in this district. The production characteristics of livestock are not entirely because of heredity, but it is influenced by environment also. Heredity provides the ability to exhibit certain characters whereas environment provides the opportunity to express them. The capacity of animals to cope with the climate and the disease environment of a locality/region and to maintain a healthy status is a profound importance to livestock production system. Genetic superiority of the indigenous stock for the ability to adopt to thermally adverse environment may result in better survivability of these animals. But considering their low production potential breed improvement programs were initiated in this district to infuse exotic blood in the indigenous germplasm to augment production to meet the ever growing demand of animal protein.

A look into the land use pattern for livestock reveals that the status of land use pattern for livestock production (total reported area 395 million hectare) on wards. Out

of the total geographical area in India only 3.87 percent comes under pasture cum grazing land, while 6.96 percent comes under barren cum uncultivable land. It is suggested from different quarters to develop the waste land into land for feed and fodder production which may solve the most critical constrains that stands in the way of livestock improvement. It has already been mentioned that in Goalpara district total barren and uncultivable land is 16880 hactres (17.98 percent of the total geographical area) which may be utilized for such purpose. It is not out of place to mention that agricultural waste is a serious and increasing problem. It has been estimated that 70 percent of the total expenditure in the waste management goes to meet the collection and transport charges and the remaining 30 percent is spent towards treatment and disposal. There has been an increasing attention on agricultural waste management with the objective of continued food production while minimizing environmental pollution. Two competitive uses for crop residues are being discussed now a days. They are used as animal feed and energy source. Following traditional practices farmers in South Asian countries including India utilize crop residues for cattle feed, livestock bedding, litter materials in deep litter housing system of poultry, thatching material for house of both animal and human and fuel. In India the paddy straw treated with urea is widely used in dairy farming. Thus, the use of crop residues of agriculture in livestock and dairy industry is a glaring example of industrial symbiosis which enhances stability to livelihood management to millions.

The profitable farming system in Goalpara district includes cropping, animal husbandry, fishery, forestry, horticulture, poultry, duckery etc. The animal husbandry components generally consist of dairy, goatery, piggery, whereas poultry include duckery, Desi fowl for egg and meat production and broiler production. Integration of various enterprises have great potentialities in rural economy which not only supplement the income of the farmer but also help in increasing the family labor employment.

The district of Goalpara with a total of 861 revenue village is inhabited by a total population of 10,08,959 (as per 2011 census) and sex ratio of 1000:956. There are at present 12 nos of agricultural division circles and 18 nos state Veterinary. Dispensaries and 18 veterinary sub-centres. Under the Animal Husbandry and Veterinary department

there is one regional fodder seed production farm, one district poultry farm, one pig farm, one frozen semen bank and one disease diagnosis laboratory.

As per the 19th livestock census total livestock population in the district is 476,642 nos out of which 60.52 percent is cattle, 19.85 percentage is goat, 19.82 percentage pig and the remaining comes from other species. The total poultry population in the district is 924253 nos where indigenous fowl and duck constitutes 68.42 percent and the remaining from hybrid fowl. Total milk production during 2017 -2018 was 194.92 lakh litre, while total meat produce was 1484.83 tons and egg production was 175.68 lakh numbers. On the other in the year 2015-16, milk, meat and egg production were estimated 236.78 lakh liters, 1324.29 tones and 182.18 lakh nos respectively. In the year 2016-17, the production report of above commodities was estimated at 216.60 lakh liter, 1475.20 ton and 120.89 lakh nos. The trend of production of meat and egg were found to be in increasing trend.

Having said about the components of the agro ecosystem i.e. soil, plant, and animal, it is now intended to describe the interacting community or the human component. The population of the district is a mixed one comprising of different religious like, Hindu, Muslim, Christian, Jain etc. The majority population consists of Muslim followed by Hindu and presence of people of other religion forms small proportion.

The Goalpara district formed a part of the ancient Kamrup Kingdom which during mediavel period was called Kamatapur and Koch Kingdom. The division of Koch Kingdom after the death of great warrior Chilaray gave birth to Koch Hajo and Koch Behar. Since ancient time the indigenous or local people called themselves Desi or indigenous in order to differentiate themselves from the outsiders. Thus, the language they spoke was called Desi language or Desi bhasa or goalpariya bhasa . The Desi or indigenous people consisted of Koch, Rajbongshi, Nath-Yogi, Mech, Rabha, Bodo, Hajong, Garo, Kalita, Kumar, Kohar, Brahmin and Muslim. The present Goalpara district which was a subdivision of the Erstwhile Goalpara district formed a part of Koch-Hajo which was invaded by Pathan and Mughals. Therefore, after the fall of last Koch king it became a part of Mughal Empire and later on of British India. The descendants of Mughals and pathans mixed with local people and that was beginning of

Islam religion in this region. But later on, many people from Bodo, Rabha, Rajbongshi converted to Islam due to various reasons. They are now known as Desi or Indigenous Assamese Muslim or Goria Muslim. During 1940's due to Bengal famine British Govt. in India laid emphasis on enhancing food grain production and launched the grow more food campaign. Under such programs Muslim peasants were brought from Bengal to Assam and were settled in char areas (riverine) for cultivation. This section forms the immigrant Muslim in Assam, who are hardworking people and have great contribution in agricultural production.

In Independent India the constitution was adopted where there are 12 schedules. The socially untouchable people were included in the schedule and were called scheduled caste, whereas the aboriginal people not belonging to traditional Hindu society were also included in the schedule of Indian constitution and are known as scheduled tribe. Therefore, in Goalpara district the people fall in several categories like scheduled caste, scheduled tribe and backward caste and general category.

In the present study the population has been divided into tribal and non-tribal. The tribal people are indigenous and have maintained their culture and tradition and some of peculiarities in their farming system and consist of Bodo, Rabha, Garo and Hajong in the study area. On the other hand, the non-tribal group consisted of scheduled caste, other backward caste and general caste. Some of these non-tribal people are also indigenous and include –Koch, Rajbongshi, Nath Yogi, Kalita and Desi Muslim etc.

With the above mentioned theoretical and empirical evidence existing in the study area, the present parameter was designed to gather information from rural women in order to assess their perception regarding the impacts of livestock enterprises upon livelihood sustainability. There were as many as twenty statements which expresses the feelings of the respondents in respect of the nature and type of impact that livestock enterprises could have upon livelihood sustainability. Responses of the respondents were sought against each statement in a three point continuum – fully, partially and never for which scores of 3, 2 and 1 were assigned respectively. The scores of an individual respondent were summed up to yield the total score. Thus, mean and S.D. were worked out to make three categories – low, medium and high and presented in the Table 7.1

Table 7.1. Frequency distribution of the respondents on the basis of their perceived impact of livestock enterprises in livelihood sustainability

Sl. No.	Impact of livestock enterprise	Fully F			Never N			Partially P		
		NT	T	Polled	NT	T	Polled	NT	T	Polled
1	Ensure income for household support	37	73	110	0	0	0	138	102	240
2	Overcome seasonal crisis	53	44	97	1	0	1	121	131	252
3	Get bank loan	51	44	95	14	17	31	110	114	224
4	Support family health	101	94	195	1	0	1	73	80	153
5	Support children's education	49	33	82	1	0	1	125	141	266
6	Training for knowledge& skill development	29	26	55	1	3	4	134	144	278
7	Food security	18	21	39	0	1	1	141	148	289
8	Enhance self-esteem and social status	44	39	83	1	0	1	130	135	265
9	Ensure corporation from social group	72	51	123	1	1	2	102	122	224
10	Solve unemployment	67	38	105	4	2	6	104	133	237
11	Make membership in social organizations.	25	19	44	3	3	6	147	151	298
12	Maintain cultural heritage	20	15	35	103	116	219	52	42	94
13	Feeling of inclusion in society	24	18	42	9	3	12	142	152	294
14	Avail services like electricity	36	29	65	4	0	4	135	146	281
15	Reduce vulnerability period like flood	63	32	95	3	2	5	109	136	245
16	Build better house	17	16	33	35	29	64	123	128	251
17	Helps buy motor cycle etc.	27	15	42	26	32	58	117	124	241
18	Helps acquire more land	0	5	5	133	149	282	37	17	54
19	More sustainable use of resource	20	25	45	19	3	22	131	144	275
20	Get regular case flow	60	37	97	5	0	5	107	135	242

Note: N.T = Non- Tribal T = Tribal.

A perusal in Table 7.1 revealed that a substantial segment of both tribal and non - tribal women fully realized the role of livestock enterprises in livelihood sustainability and this got reflected in their responses in the statements like – "Ensure income for household support", "overcome seasonal crists" ,"Get bank loan" ,'Support family health' ,' Training for knowledge and skill development' 'Food security' ,' Enhance self esteem and social status' ,' ensure co-operation from social group' 'Solve unemployment problem", "make membership in social organization", "Feeling of inclusion in society", "Avail services like electricity" , "Reduce vulnerability period like food" and "More sustainable use of resources" . A substantial number of both tribal and non-tribal women fully agreed with the above mentioned statements expressing the impact of livestock enterprises it their livelihood sustainability.

The perception of the rural women irrespective of their ethnicities was alike. A view on both primary and secondary data gathered from the district made it adequately clear that the people engaging in livestock enterprises of various types and nature could raise their household income. The road connectivity from the district to different urban centers and more importantly Guwahati city has made it convenient for livestock entrepreneurs to gain lucrative price for their livestock produce and products. The hawkers and middlemen collect such products and transport then to towns and cities. Hence such enterprises appeared to have contributed positively towards livelihood sustainability.

It has already been mentioned that most of the rural women belonged to households with agriculture as their primary occupation. Therefore, traditional agriculture or scientific agriculture give rise to some seasonal crisis. Generally, the harvesting period earns the women with the inflow of cash. But the lean period make them cash deprived. Therefore, the rural women who keep small animals or poultry can reap the benefit at such time of seasonal crisis.

Credit availability and credit delivery system are of vital importance for rural people, particularly rural women. The private money lenders and usurers exploit the rural

men and women folk by lending them money at exorbitant rate of interest. Therefore, the credit facilities from the public sector banks, co-operatives and other financial institution assume significant importance for rural folks. In this connection the annual credit plan of Goalpara district for the year 2017 -2018 revealed that a large amount was disbursed as loan for dairy unit, poultry unit and small animal like sheep, goat and pig. The respective loan amount for the above mentioned sectors were 22.0 crore, 7.30 crors and 10.23 crores. Another interesting feature was that disadvantageous segment like scheduled Tribe and schedule Caste beneficiaries got benefits of subsidies. Therefore, it was only natural that the prevailing situation in the district was conducive for obtaining loan for livestock enterprises and hence the respondents perceived that keeping livestock and poultry had an advantage of getting loan from public sector financial institutions.

Livestock produce and products provide animal protein and it is needless to mention that the livestock entrepreneurs always prefer to keep a portion of their livestock products for domestic consumption. It is almost a morale dictate when children or old ailing family members badly need animal protein. Therefore, the role of livestock enterprises in supporting family health is understandable.

Rural children generally read in local school for their primary, middle and secondary level education and exert pressure upon mothers for their day-to-day small educational expenses like ink, pen, paper, pencil and such other paraphernalia. It is not hard for the rural mothers to manage such petty amounts demanded by their children from the earnings accrued from sale of egg, milk, chicks or ducklings. Therefore, rural women having being engaged in livestock activities find some plus points emerging from livestock sector contributing to livelihood sustainability.

Training is the means for human resource development and such programs are conducted with an aim of transferring knowledge to rural people to facilitate than to take up some vocation for income generation. Now a day more emphasis is laid on training rural women for skill development with a view to empower them. Hence women empowerment program has spread in different directions and dimensions covering agriculture, horticulture, fishery and livestock. Of late skill development program is gaining popularly because simply transfer of knowledge is of little or no value unless and

until the trainees can develop skill hands and put them into practice. Realizing this fact Govt. of India has initiated several measures for skill development training. Already skill development Mission has started operation in full measures. Besides, several non-Govt. organizations, Krishi Vigyan Kendra, ATMA, SIRD, NIRD and State Departments are imparting training those interested in livestock enterprises. Such programs have resulted in a conducive environment and echoed in the perception of respondents.

Food security has attained from local to national and international significance. Simply caloric intake does not ensure food security. Proper nutrition can only ensure food security for which animal product like egg, meat and milk and milk products are being increasingly demanded even by rural masses. It is no longer luxurious to have meat, milk or other such items of animal origin. The animal protein also enhances immunity of human body. Considering all these, the rural women have undoubtedly put their responses and have rightly perceived the role of livestock enterprises in livelihood sustainability.

Self esteem and social status are the human needs at higher level. Maslow"s need hierarchial theory underlines the basic needs of food, shelter and cloth. But having these basic needs fulfilled an individual starts longing to attain self esteem and social status. Many a livestock entrepreneur could make a mark in their career in the recent past. And such success stories are galore to influence even the ordinary livestock keepers to focus on that line.

Co-operation and cohesion in society are essential elements and social groups need such social capital for continuity, growth and development. Since the Golden Jubilee of India's independence, the self-help group concept in our country has taken strong roots. Livestock entrepreneurs have organized numerous such self-help (SHG) and joint liability groups (JLG). In fact, self-help group formation has given birth to so many remarkable success stories in livestock, dairy and poultry sector. Therefore, the concept of Self-Help Group (SHG) and joint liability group (JLG) has caught the attention of the rural women and its contribution to livelihood sustainability has been aptly perceived.

Unemployment problem in our country has attained an alarming shape and has proved to be the root cause of many social evils. The country has observed the silver Jubilee celebration of launching the market economy where start-ups and business sectors are fast catching the attention of youths and elders alike. Livestock enterprises and its backward and forward linkages have provided ample employment avenues and thereby proved its worthiness in livelihood sustainability. These have rightly been reflected in the perception of rural women engaged in livestock activities.

The concept of inclusive growth advances opportunities for economic participants with benefits incurred by every section of society. The livestock entrepreneurs avail almost equal opportunities in terms of access to market, resources and unbiased regulatory environment. The provision of dairy co-operatives is a vivid – example in this respect. In Assam also a number of success stories have come to light. Against this back drop the attitude and perception of rural women of having developed eagerness to seek membership in social organizations is not hard to comprehend. Moreover, the prevailing situation and the emerging business environment have only developed the feelings of inclusiveness among rural people even women.

The low input and small capital needed in livestock enterprises is another factor which favours the vulnerable section in the society to usher in a new path where sustainable use of resource is possible and feasible and the essential service like electricity can easily be availed.

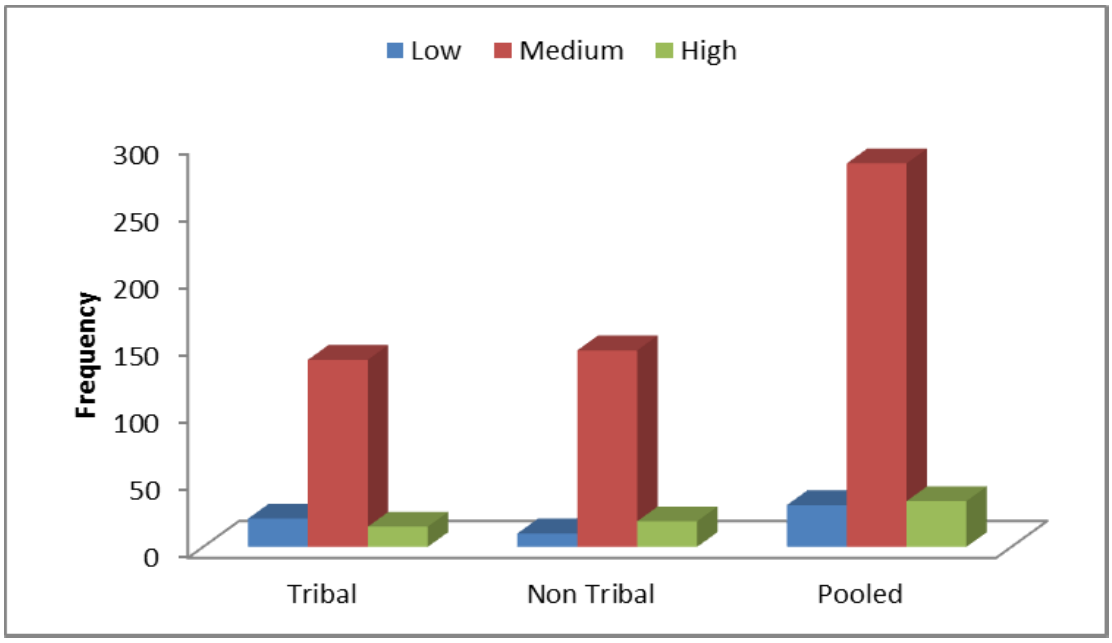
7.2. LEVEL OF LIVELIHOOD SUSTAINABILITY

The above discussion has clearly delineated the impact of livestock enterprises on livelihood sustainability. Further the level of livelihood sustainability was also measured with the same instrument used in data collection which is depicted in the Table 7.2

Table 7.2. Frequency distribution of the respondents on the basis of their level of perceived impact of livestock enterprises in livelihood sustainably .

Category	Tribal		Non- Tribal		Pooled	
	Frequency	P.C.	Frequency	P.C.	Frequency	P.C.
Low (<37.01)	21	6.00	10	2.86	31	8.86
Medium (37.01 – 46.49)	139	39.71	146	41.71	285	81.43
High (>46.43)	15	4.29	19	5.43	34	9.71
Mean	40.39		42.52		41.75	
SD	4.49		4.86		4.74	
t value	3.08**					
Range	23-53		23-64		23-64	

**significant at 1 percent level of probability.



(Source: Table 7.2)

Fig. 24. Frequency distribution of the respondents on the basis of their level of perceived impact of livestock enterprises in livelihood sustainably

Table 7.2 indicated that majority of the tribal women (39.71 percent) had derived medium level of livelihood sustainability followed by 6.00 percent having low and 4.29 percent having high livelihood sustainability. The mean and S.D. were 40.39 and 4.49 respectively.

In the case of non-tribal women 41.71 percent had medium level of livelihood sustainability while 5.43 percent had high and 2.86 percent had low level of livelihood sustainability. The mean and S.D. were 42.62 and 4.86 respectively.

In pooled sample a large majority of the rural women (81.43 percent) had medium level of livelihood sustainability followed by 9.71 percent with high and 8.86 percent with low livelihood sustainability. The overall mean and S.D. were 41.75 and 4.74 respectively. The 't' value (3.08) indicated that there was a significant difference in the level of livelihood sustainability. The non-tribal women had perceived higher level of livelihood sustainability than the tribal females.

7.3. ROLE OF WOMEN IN ENHANCING HOUSEHOLD FOOD SECURITY THROUGH LIVESTOCK PRODUCTS

According to F.A.O Committee on world food security, food security means that all people at all times have physical and economic access to the basic foods they need. For this to happen there should be safe, nutritionally adequate and personally acceptable food in a manner that maintains human dignity. In order to enjoy food security there must be on the one hand a provision of safe, nutritious and quantitatively and qualitatively adequate food and on the other, rich and poor, male and female old and young all must have access to it.

In the developing countries a major social objective is to ensure food for all at reasonable prices at all times with special provision for economically undernourished, underprivileged and other vulnerable groups of the society. This is the crux of the issues of food security.

Food security requires that at all levels, production, distribution, consumption and waste management measures need to be taken to generate a democratic and sustainable

food system. A sustainable food production system aims at satisfying the basic human needs without compromising the ability of future generation to meet their own needs. It involves maintaining ecological integrity and incorporating conservation and development. The concept of sustainable agriculture stems from the fact that there is a maximum limit of productivity of agricultural lands. If this is exceeded, then the ecosystem will degrade and collapse. Therefore, a balance has to be brought in between the productivity levels and sustainability of the ecosystem. It has already been discussed that over use of extensive chemical fertilizers, pesticides and herbicide and pumping out of ground water has resulted in major ecological, economic and socio-political repercussions. Therefore, to maintain livelihood sustainability alternative agriculture was chosen as the helpful, timely and eco-friendly methods. More emphasis can be laid on conservation of species and ecosystem.

Distribution of, and access by households and individuals to appropriate food and nutritious diet are as important aspects of security as food production. It is not enough to produce surplus food if it cannot get to those who need it. Therefore, production of food grain and other nutritious items at global, national, regional and local level has to be coordinated with the distribution system. Trade policies among and between countries favoring the timely and easy movement of food grain are important for ensuring food security.

The purchase of food grain and other dietary items from producers at maximum support price by the govt, their storage and distribution through public distribution system need to be monitored and in the event of any lapse or lacunae corrective measures need to be ensured. Thus, domestic agriculture production or import of food commodities can ensure sufficient supply of food for all people at all times and this has proved as a precondition for food security and historically a major challenge in many developing countries.

In 1979, the World Food Program conceptualized food security, equating it with an assurance of supplies and a balanced supply demand situation of staple foods in the international market. The report also emphasized that increasing food production in the developing countries would be the basis on which to build their food security. Today the

greatest challenge which the world community is facing are the issues of socio - economic growth, poverty reduction, human welfare and development and the production of earth's resources and economics and life support system. People, govt., and the scientific communities all over the world have now realized the importance of sustainable strategies. These groups have stressed the need for harvesting both scientific knowledge and technologies on the other hand, and traditional knowledge on the other to solve many issues related to sustainable natural resource management and biodiversity conservation.

An access to adequate food by households over time doesn't necessarily imply that each member has received food security. There are some people who can't afford for it or don't know how to use it. Food security depends on household income accesses and knowledge. Thus, the issues of food security are intimately linked with the socio-economic condition of a given society. Intra household factors may also affect suitable and adequate accesses to food by all members. Cultural and social factors of the households sometimes preclude the women and girls from getting an equitable share.

During green revolution efforts were focused on large farmers, quantity of food produced (wheat and rice) and economies of scale without paying enough attention to the sustainability of the production practices. Moreover, not much attention was paid to the production of nutritionally superior grains such as coarse cereals and pulses which have been extremely uneven over last several years; consequently the entire country has been adversely affected with nutritional security. One third of the total population living below poverty line has been affected with wide spread protein deficiency and malnutrition. Coarse cereals and pulses are known sources of protein for common men, but per capita availability of both has declined constantly. Here lies the importance of livestock products like meat, milk and egg.

Unequal distribution of wealth, power and resources are seen today as major barriers of food security. Other constraints include commodification of food, environmental degradation, trade agreement that encourage cash cropping rather than food production and agricultural resource without farmers participation.

As the share of agricultural product to GDP show the upward trend since 1990, therefore a proclivity to define food security at national level was observed. But in reality, it has been seen that even after ensuring food security, disparity may appear among regions, communities, households and individuals. There are range of factors which are likely to contribute to food insecurity. Poverty is an important determinant of food insecurity. The proportion of poor people is generally high in rural area and such people don't have adequate means or entitlement to have access to food despite its availability in local or regional market.

Unemployment in rural areas is another factor of food insecurity. Although the share of agriculture to GDP has come down in India after liberalization and service sector is dominating the economy, yet rural people are dependent upon agriculture,

Land distribution is highly skewed in India where $2/3^{rd}$ of the farmers are small or marginal farmer who find it difficult to adopt new technologies and mechanizations

In India the fluctuation in the availability of food stock is a common phenomenon. The role of Private traders and other unscrupulous agents in creating artificial scarcity of food is a known fact. To cheek such malpractices public distribution system was designed but its performance is not beyond doubled.

Against this backdrop the role of livestock in food security needs to be evaluated in a wider perspective. It has been noticed by agricultural scientists that growth rate of major food grains are declining in India which might be attributed to the stagnation in bringing more land under cultivation and also failure in increasing the productivity further. This is particularly important for pulse production. A negative growth trend in pulse production in India has some serious implications as per capita availability is constantly declining. As per the recommendation of ICA 60 gram protein is required per day per adult person with net protein utilization (NPU) of 65, Therefore it is necessary to substitute vegetable protein with animal protein to achieve protein quality of NPU of 65 in human diet. On the other hand, production of livestock product during the corresponding is increasing. Data have revealed that when per capita consumption of gram and pulses is decreasing, the consumption of animal protein is increasing during the corresponding period. As a thumb rule a person's daily protein intake should be 1

gram per kg body weight for adequate nutrition and 30-35 percent of daily protein intake should be animal protein to provide optimal range of amino acids.

Further livestock production in the country provides employment to large number of rural people. For instance, during 2003 a total of 11 million people got employment in livestock sector as principal status and 8 million as subsidiary status. Moreover, around 71 percent of workforce engaged in livestock sector is women (***Source annual report, 2003-04 Department of A.H., Dairying and Fisheries, Ministry of Agriculture, Govt. of India***). Thus, livestock plays a key role in providing financial security and food security to a large number of people.

Role of livestock as draught power has still significance as they are used for ploughing fields, pulling carts, lifting water and sliding heavy wooden trucks of large trees. Although mechanization is increasing rapidly for similar purposes, the marginal and small farmers constituting the bulk of Indian population will continue to use them in the near future.

Use of manure for crop production has direct link with sustainable livelihood and food security. It has already been mentioned that wide spread and non-judicious use of chemical fertilizers has brought threats to human health. Therefore, organic farming with manure from livestock is gaining significance.

Collection and drying of dung for cooking also generates income for women. Biogas production has another dimension to the use of manure as a source of energy.

Findings of the present study have revealed the involvement of rural women in different activities which are directly related to feeding, housing, care and management and marketing of livestock and their products. Their time spending pattern and nature of participation were also estimated. Besides these, women can participate in value addition practices. Recently the market potential for value added dairy products, value added meat products and value-added egg products are showing an upward trend. In India where 14 percent of the GDP is obtained from agriculture, the income from livestock rearing and dairying forms a lion's share. Value addition in livestock and dairying has tremendous role where women can participate and play crucial role in financial security and food

security. Flavored milk is increasingly becoming popular as consumers are getting more health conscious. There is growing tendency to buy healthy foods in place of other forms of beverages. Flavor milk thus constitute a good substitute for carbonated soft beverage and significant value addition is possible either through packaging or through the innovative formulation. There are a number of curd based products now in the market such as lassi, buttermilk, etc. which were earlier the domain of the unorganized sectors. Other traditional products such as panner, khoa and khoa based sweets are actually the stronghold of small and unorganized players.

India's livestock population is largest in the world with 50 percent of world's buffalo population, 20 percent of cattle population and $1/6^{th}$ of total production, but only 1 percent of total meat produced in the country is converted to value added products like sausage, ham, bacon, kebabs, meat balls etc. By increasing our value added meat products we can earn foreign exchange also. Rural women can participate in such value added meat products production and marketing. India is a third largest producers of egg and 5^{th} largest producer of poultry meat in the world. The demand for value added egg products also growing fast and rural women can extend their domain of work to this sector also.

In Goalpara district, the sex ratio was 964 females per 1000 males against the state figure of 958. Total number of households in the district is 198,454 and the number of tribal households 95, 633. Total main workers in the district were 266, 376 including 222,68 male and 43, 636 female, whereas total marginal workers were 96, 197 including 44, 438 male and 57, 759 female. Total cultivators in the district were 126, 543 out of which 103, 203 male and 23, 340 female. Total number of agricultural labors were 75, 828 with 49, 559 male and 31, 263 female. Total tribal workers were 104, 452 with 63, 132 male and 41, 320 female.

The overall literacy rate in the district was 67.37 percent while male and female literacy rates were 71.46 percent and 63.13 percent respectively. On the other hand, overall literacy rate among tribal people was 22.97, and male and female literacy rate were 22.00 percent and 23.35 percent respectively.

The Assam Economic Survey (AES), 2017 discussed 59 core indicators that the state had adopted to assess progress on the sustainable development goals. In this report the indicator value for poverty in Goalpara district was 0.14, which was categorized as very poor and therefore this district found its place in the bottom level along with other 17 districts. The Poverty count ratio in the district was 40.5. In the same manner composite indicator for hunger and nutrition was 0.13 and the district found its place in the bottom just before Dhubri. The proportion of women within 20-24 years age getting married before the age of 18 years was 20.8. However, it is happy to note that composite indicator for gender equality in the district was 0.07 which was categorized as satisfactory. Equally important is the fact that average index score on rural inequality in the district was 0.83 which was also judged satisfactory.

The total number of poor people covered under National food Security act, 2013 was 37613 during-2013. The food and civil supply department, govt. of Assam, through fair price shop under public distribution system and also through Amar Dokan shops providing 23 essential commodities at much lesser price than the printed MRP. Out of the 23 items 22 are non PDS and one is PDS i.e. iodized salt. Even though it is observed that in the district there is increasing demand for protein in the food for nutrition status, the meat protein supplement in the diet and only be provided thorough livestock products like milk, meat and eggs, as other food items under PDS cannot meet the demand for requirement of protein for the balance diet of individual. There lies the importance of animal foods products.

With the above mentioned relevant data about Goalpara district in respect of poverty, hunger and nutrition, gender equality and unemployment et it is now pertinent to mention the production trend of different food grains like Rice, pulses etc. and also that of the livestock products during the corresponding period. The total production of Rice was 208282 M.T. in the year 2016-17 against the requirement of 132495 M.T. in the district. Thus, there is a surplus rice production of 75787 M.T. during this period. On the other hand, total pulse production was 6146 M.T. during the same period against the requirement of 26515 M.T. and hence the district witnessed a deficit in pulse production of about 2036 M.T.

It has already been mentioned that 1 g of protein is required per kg body weight of human for adequate nutrition. As there is surplus Rice production and Rice being provided to the poor at subsidized rate under National Food Security Act-2013, therefore Calorie intake poses no problem for the poor, but protein requirement stands to be insurmountable issue for them. As pulse production is much below the required level, imported pulse becomes costly for them, which is not supplied under the public distribution system. In this connection the growth trend of the livestock product in the district bears relevance. ICMR recommendation for milk is 280 g/day, eggs 182/annum and meat is 11 kg/annum. The per capita availability of milk, and egg in the year in 2016-17 were 78 ml/day and15 numbers/annum in Assam, on the other hand per capita availability of milk, egg and meat at the national level were 337 g/day, 69 numbers/annum and 2.96 kg/annum. The total egg production in the year 2017-18 in Goalpara was estimated at 175.68 lakh nos against 120.89 lakh nos of the previous year 2016-17. It reveals that the growth rate of egg production is increased by 4.5 percent over the previous year. In respect of meat production in the same year which was estimated at 1484.83 ton against the estimated production 1475.20 ton in the previous year indicates that the growth rate is also increasing marginally. The increasing trend of production of meat and egg speak that increase of protein supplement in the diet of the consumers of the district. While in respect of milk production in the year 2016-17 estimated at 216.63 lakh liters with respect to the estimated production at 238.78 lakh liter in the year 2016-17 marginally observed to be decreased may be due to high cost of management of high yielding cows and also proper Govt. supports in extending the activities of the milk production in the district. However, the trend of production of livestock products in the districts is very promising if proper technical, financial and supports from other agencies are properly given. As the district is having good nos of livestock and poultry resources.

Therefore, against the very low growth rate or negative growth rate of pulses and grams in the district the livestock product like milk, meat and eggs are maintaining steady growth rate. Although the pulse is called the poor man's protein, in this district due to its shortage of production locally it became costly for rural poor. Under such circumstances the livestock products milk, meat and egg play a key role in substituting the vegetable protein. For instance, a comparison can be demonstrated between the

pulses and broiler chicken considering their prevailing market price in the district. One Kg of Masur dal (whose protein content is highest among the pulses) costs Rs. 80 per kg where protein content is 24 percent. On the other hand, one kg broiler meat costing Rs 80 contains 35 percent protein. Therefore, broiler chicken, pork, beef and egg are playing a pivotal role in providing food security in this district.

Having discussed the ground realities in Goalpara district and the national, international and regional scenario in respect of food security, it is now intended to interpret the primary data collected from rural women with a view to estimate their perception in respect of household food security for livestock products and details are presented in the Table 7.3.

It is visible in the Table 7.3 that as many as 16 statements expressing their perception were incorporated in the interview schedule in order to elicite responses of rural women regarding household food security.

The statement 'keeping livestock helps to make food available' received mixed responses from the tribal and non-tribal women. Majority of them replied in 'sometimes' category followed by 'very often' and 'regularly' category. It was interesting to note that none of the respondents recorded their responses in 'never' category, which implied that nobody disagreed with the role of animal keeping in helping to make food available. Although there was variation in percentages of tribal and non-tribal women, it was unequivocally admitted that livestock help them in making food available in more than one way. After liberalization, privatization and globalization (LPG) introduced in the country. Purchasing power of both rural and urban has increased many folds. The livestock produce and products produced locally now fetch higher prices than those imported from outside. Therefore, rural women by keeping livestock and poultry of indigenous breed can earn handsome amount and thereby can earn their livelihood, particularly can procure food items. Hence, they feel household food security through livestock products.

Table 7.3. Frequency distribution of the respondents on the basis of their perceived household food security through livestock produces.

Sl. No.	Statement	Regularly R			Very often V			Sometime S			Never N		
		NT	T	Pooled	NT	T	Pooled	NT	T	Pooled	NT	T	Pooled
1	Keeping livestock help to make food available	36	11	47	24	38	62	115	127	240	0	0	0
2	Provide more milk to family	56	16	72	100	134	234	18	24	42	1	0	1
3	Provide more eggs to family	88	105	193	56	53	109	14	15	29	17	0	17
4	Provide more meat to family	57	25	82	19	42	61	83	106	189	16	0	16
5	Provide diverse diet to family	23	6	29	10	16	26	142	152	294	0	0	0
6	Take decision of increased consumption	23	3	26	16	34	50	135	138	273	1	0	1
7	Enables diversity diet	25	4	29	45	35	80	103	135	238	0	0	0
8	Makes food supply stable	23	6	29	52	52	104	96	114	210	2	2	4
9	Help family for better utilization	23	4	27	47	33	80	98	130	228	5	7	12
10	Food containing vitamin and mineral	59	27	86	62	104	166	43	38	81	9	3	12
11	Consumption to both genders equally	62	5	67	24	53	77	77	108	185	11	9	20
12	Regular cash flow	42	20	62	31	13	44	90	127	217	9	12	21
13	Draught power	30	7	37	23	40	63	56	33	89	65	90	155
14	Manure for plant nutrition	63	24	87	70	127	197	21	17	38	15	5	20
15	Generates income to women	23	8	31	41	21	62	105	144	249	5	1	6
16	Equitable distribution of income	32	7	39	28	27	55	112	139	251	1	0	1

Note : N.T = Non- Tribal T = Tribal.

The three statements ‘provide more milk to family’, ‘provide more eggs to the family’ and ‘provide more meat to family’ are similar in content and intent. The data revealed that a large number of rural women (193 nos) in pooled sample expressed their agreement that keeping of fowl and duck help them to provide more eggs to family members in their diet. It was observed by the researcher during data collection that among Muslim and tribal people there was no taboo against fowl keeping and indigenous fowl is reared for both meat and egg production. The caste Hindu People along with other communities invariably keep ducks due to the presence of large no. of water bodies. Therefore, domestic production of eggs might have enabled them to provide it in their diet. Although less in no, similar responses were received in other two items also.

It needs no mention that income from livestock is generated all the year round and hence seasonal variation in crop production or other agricultural produces cannot affect the consumption pattern of livelihood. More assured income from livestock enables the household to plan for increased consumption and better utilization of resources. Domestic production of meat, milk or egg in the household enables it for dietary diversity, which very often supply vitamin and mineral. Assured and adequate amount food item with diverse contents removes gender inequality in terms of consumption both in quality and quantity.

Rural women generally take part in dairying where they participate in feeding, care and management and also value addition process of surplus milk. Thus, they earn subsidiary income. Besides dairy, they keep small animal and poultry. Selling of eggs or bird earn them regular cash flow.

It was earlier mentioned that synthetic fertilizer, pesticide and herbicide have created many health hazards for which people are now conscious about the food grains and vegetables and hence organic locally grown food grains and vegetables are gaining popularity. An animal excreta assumes more significance for organic production and naturally large no. of rural women responded positively for manure for plan nutrition.

In conclusion it can be said that engagement of female work force in livestock sector helps them for higher income generation and also equitable distribution of income.

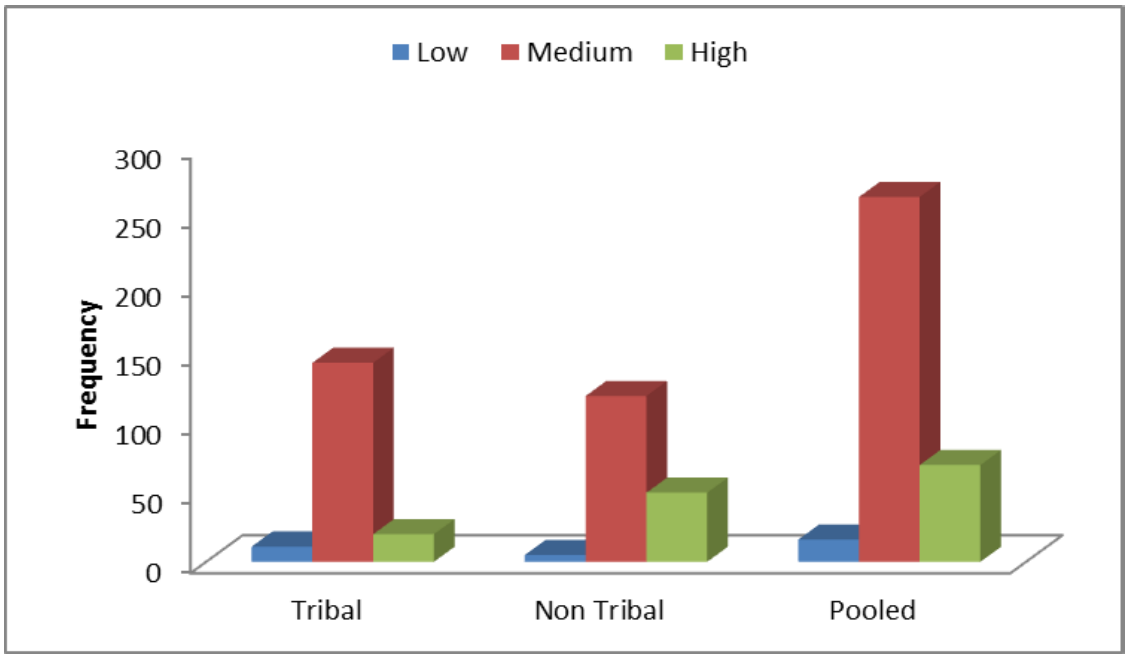
7.4. FREQUENCY DISTRIBUTION OF THE RESPONDENTS ON THE BASIS OF THEIR LEVEL OF PERCEIVED FOOD SECURITY THROUGH LIVESTOCK PRODUCTS

Perception of the rural women was measured by 16 statements in a four point continuum- regularly, very often, sometimes and never for which scores of 4,3,2,1 were respectively assigned. For an individual respondent score of all the 16 statements were summarized up to yield the total scores. Thus, mean and standard deviation were work out to categorized the respondents into 3 categories- low, medium and high and details are shown in the Table 7.4.

Table 7.4. Frequency distribution of the respondents on the basis of their level of perceived household food security through livestock products

Category	Tribal		Non -Tribal		Pooled	
	Frequency	P.C.	Frequency	P.C.	Frequency	P.C.
Low (< 32)	11	3.14	5	1.42	16	4.57
Medium (32 – 43)	144	41.14	120	34.29	264	75.43
High (>43)	20	5.71	50	14.29	70	20.00
Mean	38.55		42.80		40.68	
SD	6.88		10.04		8.89	
t value	4.61**					
Range	23 – 59		23 – 64		23 - 64	

**significant at 1 percent level of probability.



(Source: Table 7.4)

Fig. 25.Frequency distribution of the respondents on the basis of their level of perceived household food security through livestock products

It was observed in Table 7.4 that majority of the tribal women (41.14 percent) perceived medium level of household food security through livestock products, while 5.71 percent and 3.41 percent perceived high and low food security. The mean and standard deviation were 38.55 and 6.88 respectively. On the other hand, 34.29 percent, 14.29 percent and 1.42 percent of the non-tribal women perceived medium, high and low level of household food security. The mean and standard deviation were 42.80 and 10.04 respectively.

In pooled sample 75.43 percent derived medium level of food security, while 20.00 percent had high and 4.57 percent had low level of food security. The mean and SD were 40.68 and 8.89 respectively.

The t value (4.61) indicated that there was a significant difference between tribal and non-tribal women in respect of their household food security through Livestock product.

Testing of hypothesis

In order to see the relationship of livelihood sustainability with improved livestock management practices and level of participation in livestock related activities, co-relation co-efficient was conducted. Details are presented in the Table 7.5 and 7.6

7.5. RELATIONSHIP OF LIVELIHOOD SUSTAINABILITY KNOWLEDGE LEVEL IMPROVED LIVESTOCK MANAGEMENT PRACTICES AND LEVEL OF PARTICIPATION IN LIVESTOCK RELATED ACTIVITIES

Table 7.5. Relationship of livelihood sustainability with knowledge level, improved livestock management practices and extent of participation in livestock related activities.

Independent variables	r value		
	Tribal	Non -Tribal	Pooled
Knowledge level	0.0216 ^{NS}	0.2861**	0.1473**
Improved livestock management practices	0.2051**	0.3146**	0.2024**
Participation in livestock related activities	0.1453*	0.3499**	0.2299**

* Significant at 5 percent level of probability.
** Significant at 1 percent level of probability.

Table 7.5 revealed that knowledge level in improved animal husbandry in non-tribal women had a positive and highly significant co-relation with the livelihood sustainability. But tribal women failed to such relationship.

In the same table improved livestock management practices had shown positive and highly significant co relation with livelihood sustainability for tribal, non-tribal and pooled sample. On the other hand, participation in livestock related activities had positive and significant co relation with livelihood sustainability in tribal women where as it had positive and highly significant relationship with livelihood sustainability for non-tribal women and pooled sample. Likewise, co relation co efficient was worked out between perceived level of household food security with livestock products like milk meat and eggs.

7.6. RELATIONSHIP OF FOOD SECURITY WITH LIVESTOCK PRODUCTS

Table 7.6. Relationship of food security with livestock products

Livestock products	r value		
	Non- Tribal	Tribal	Pooled
Milk	0.0428^{NS}	0.3409**	0.2756**
Meat	0.2018**	0.0274^{NS}	0.133*
Egg	0.2586**	0.0803^{NS}	0.138**

* Significant at 5 percent level of probability.
** Significant at 1 percent level of probability.

Table 7.6 Revealed that milk exhibited positive and highly significant relationship with perceived level of household food security for non-tribal women where as it failed to show such relation in tribal women**.**

Meat on the other hand failed to show significant relationship with food security in non-tribal women. But it displayed positive and highly significant relationship with food security.

The same trend was observed for egg also.