

Agricultural Research Priority : Vision- 2030 and beyond

Sub-sector: Livestock

**Professor Dr. A.M.M. Tareque
And
Dr. Shah Md. Ziqrul Haq Chowdhury**

**Bangladesh Agricultural Research Council
Farmgate, Dhaka**

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Research Priority in Agriculture and Vision Document-2030 and beyond

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Research Priority in Agriculture and Vision Document-2030 and beyond

Methodology/Work plan

Twelve Experts Team have been formed in BARC in connection with the preparation of Vision Document–2030 and beyond vide letter No.ARC/P&E/103/2008/1540, dt. 29-10-09. Livestock Sub-sector group composed of Professor Dr. A.M.M. Tareque, as Group Leader and Dr. Shah Md. Ziqrul Haq Chowdhury, CSO (Livestock), BARC, as Member-Secretary.

The work started with the convening of a day long workshop on SPGR priority setting on the 25th October, 2009.

Terms of Reference (TOR) of the Group Leaders are as follows.

1. Consultation and review of the documents related to agriculture and rural development. These are, but not limited to the followings. To accomplish the task the team may need to visit the concerned institutes.
2. Through collection and collation of the information as stated in Sl.-1, work out the country's situation/issues by the sub-sector of Livestock.
3. Sub-sectoral studies are expected to be in-depth and detailed in nature. This is to cover all components, current trend in production, demand-supply and gap, opportunities, problems and constraints, required technological interventions and their analysis in the country's context. By the process determine the priority need of the concerned sector by the year 2030 and beyond.
4. Population dynamics, reduction in land resource base and degradation, issues pertaining to climate change & sea level rise (SLR), economics of commodity and non-commodity related activities, income growth rate etc. all these to be taken into account while formulating the research priority.
5. Undertake other related tasks as may be deemed necessary or evolved while performing this assignment.
6. Draft report of the teams to be presented in workshops to be organized by the Planning & Evaluation Division of BARC at suitable dates.
7. Draft final report incorporating the comments/opinion obtained from the workshops, different agencies/individuals to be submitted within two months from the date of assignment to the MD (P&E), Bangladesh Agricultural Research Council, Dhaka.

As per TOR the relevant information from different sources were collected, collated and analyzed for determining the priority settings of the problems faced by the sub-sector.

The following reports were studied: Planning Commission Reports on five year plan, Annual Budgetary Documents, Draft Sixth Five Year Plan, Agricultural Sector Review/Actionable Policy Briefs of the FAO, National Livestock Policy, Vision Document-2020 of BARC, Strategic Plan of 1996, National Agricultural Research Plan (1984-1989), Proceedings of the

Workshop on the Review of National Livestock Research Programs and Preparation Future Research Plan, Livestock Policy and Action Plan etc.

Discussion meetings were held with the members of the Faculties of Veterinary Science and Animal Husbandry, BAU, Mymensingh, under the Chairmanship of the Deans of the respective Faculties, DG, BLRI, Savar, DLS staff members and Dr. M. M. Khan, Technical Advisor, Bangladesh Poultry Industries Association. Necessary suggestions were taken into consideration. Four Regional Workshops on Agricultural Research Priority Setting were organized by BARC in four regions of the country to get the exact field problems faced by different stakeholders and the priority lists set by them were considered and included in the final draft.

The findings from different sources were studied in-depth and the draft document was prepared. The draft report of the document was presented in the workshop organized by BARC and the comments/opinions were incorporated in the Final Draft Report.

EXECUTIVE SUMMARY

BARC in the past formulated a few Research Plans and Strategic Plan with a view to have sustainable and improved agricultural production including livestock sub-sector and to satisfy the requirement of foods for the population of the country. The identified problems/constraints, the strategies and research programs so far formulated were not followed accordingly, as a result the desired goals could not be achieved which is especially true in case of livestock sub-sector. This sub-sector was neglected in the past which is evident from the inadequacy of fund allocation and shortage of manpower.

BARC recently initiated to prepare another vision document 2030 and beyond with a purpose to prepare priority settings in agricultural research so that the balanced food production targets set in the vision document is achieved and the need of the population of the country is met; to promote sustainable improvements in productivity of milk, meat and egg production including processing and value addition; to promote sustainable improvements in income and employment generation for landless, small and marginal farmers.

The study was conducted with the collection of information from different relevant sources, feed back from workshops organized in different regions with different stakeholders, discussion meetings with Agricultural Universities, Institute and Organizations. All these information were analyzed and problems, constraints were identified and the priority research settings were formulated.

Livestock is an integral component of agricultural economy of Bangladesh performing multifarious functions such as provisions of food, nutrition, income, savings, foreign currency earning (by exporting hides & skin, bone and other products), draft power, manure, fuel, transport, social and cultural functions.

Bangladesh Economic Review 2009 shows the highest growth rate of livestock sub-sector in GDP at constant prices (base year 1995-96) in the years 2004-05, 7.23% and 2005-06, 6.15% compared to 0.15% crops and vegetables and 3.91% fisheries. A lower rate of growth in subsequent years 2006 – 07, 5.49% and 2007-08, 2.44 % was observed which might be due to the incidence of Avian Influenza causing a serious loss of poultry birds.

The current contribution of livestock sub-sector to overall GDP is about 2.73% which is 17.15% of agricultural GDP. The export earning from leather and leather goods is 4.31% of the total export, 20% of the population is directly and 50% is partly dependent on this sector.

Livestock population in Bangladesh in 2007-08 was cattle 23 million, buffalo 1.3 million, goats 21.6 million, sheep 2.8 million, chicken 212.5 million and ducks 39.8 million. The per capita number of cattle was 0.16, goats 0.15, sheep 0.01, chicken 1.47 and ducks 0.27.

Although an upward trend in the production of meat, milk and egg from 2001—2008 is evident, the per capita availability of meat was 20gm/day, milk- 51ml/day and 40 eggs/year in the year (2007-08, DLS). Total production in the years 2002-2008 was milk 1.82- 2.65 million ton at a growth rate of (145.6%), meat 0.91 – 1.04 million ton at a growth rate of (114.3%), and eggs— 4770- 5653 million numbers at a growth rate of (118.5%). Demand and supply gap is more evidenced. As per FAO estimates there is a deficit of 80% in milk, 82% in meat and 63% in eggs.

The major constraints affecting the livestock productivity were identified as: absence of appropriate breed for different livestock species including poultry; shortage of quality feeds and fodder; absence of appropriate technology for improving the feed efficiency of feed stuffs; inadequate veterinary coverage and technologies for disease diagnosis, treatment and control; poor/lack of epidemiological information about major livestock and poultry diseases; shortage of quality vaccines for various infectious diseases; poor/lack of strategic disease control programs including absence of disease monitoring and information system; poor/lack of appropriate quality control, bio-security and bio-safety issues; absence of quarantine system in the ports; absence of livestock live market regulations; poor/lack of preservation techniques for livestock products and bi-products; absence of systemic marketing net work for live livestock and their products and value addition.

To achieve the projected demands for milk, meat and eggs appropriate research plans will have to be implemented to get 1.3- 1.5 times increase in the production in the years 2015 and 2020 from the base line year 2008 and in the years 2020 and 2030 an increase of 1.5 – 1.8 times.

In the light of the discussions research program areas have been identified under the headings as: animal genetics, breeding, conservation and improvement; nutrition, feed biotechnology and housing; feeds and fodder; epidemiology/surveillance of livestock diseases; characterization of etiologic agents of livestock diseases by conventional and biotechnological approach; diagnosis and diagnostics; therapy, prevention and control of livestock diseases; biologics and vaccine biotechnology, ICT for livestock health and production; safety, quality improvement and control; livestock biodiversity and conservation; socio-economic and management; processing, preservation and marketing of livestock products, bi-products and value added products; waste management and pollution control; and climate change. A number of research programs under commodity and non-commodity areas with ranks as high, medium and low depending on magnitude of the problem and extent of severity were identified. The sample research programs were shown under the respective headings.

Vision Document 2030 and beyond: Livestock Research in Bangladesh

Background

The present document seeks to provide a vision and priority need for livestock research in Bangladesh to the year 2030 and beyond having study in depth the components current trend in production, demand-supply gap, opportunities, problems and constraints and required technological interventions. In formulating research priority the factors like population dynamics, reduction in land resource base and degradation, issues pertaining to climate change and sea level rise, economics of commodity and non-commodity related activities, income growth rate etc. should be considered. Having defined the problems faced by the farmers this document attempts to suggest research priority programs that will guide the R& D activities in order to achieve the goals of production of livestock products projected up to the year 2030 and beyond, and outlines the appropriate strategies by which they will be addressed.

Livestock is an integral component of agricultural economy of Bangladesh performing multifarious functions such as provision of food, nutrition, income, savings, draft power, manure, transport, social and cultural functions. About 75% of the population rely to some degree on livestock for their livelihood specially the landless farmers. Infants, adolescents and elderly people live on milk to a greater extent majority of which is imported from abroad at the cost of hard earned foreign currency.

Table 1. GDP at constant price (Base 1995-96)

Sub-sect	Percent									
	1998-99	1999-2000	2000-2001	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Crops & Veg.	3.11	8.10	6.18	-2.39	2.88	4.27	0.15	5.03	4.43	2.67
Livestock	2.69	2.74	2.81	4.70	4.51	4.98	7.23	6.15	5.49	2.44
Forestry	5.16	4.94	4.85	4.91	4.43	4.18	5.09	5.18	5.24	5.47
Fisheries	9.96	8.87	4.53	2.22	2.33	3.09	3.65	3.91	4.07	4.18

Source: Bangladesh Economic Review -2009

Bangladesh Economic Review 2009 shows the highest growth rate of livestock sub-sector in GDP at constant prices (base yr. 1995-96) in the years 2004-05, 7.23% and 2005-06, 6.15% compared to 0.15% crops and vegetables and 3.91% fisheries. A lower rate of growth in subsequent years 2006 – 07, 5.49% and 2007-08, 2.44% was observed (Table -1) which may be due to the incidence of Avian Influenza causing a serious loss of poultry birds.

Table 2. Contribution of sector wise GDP at constant price (base yr.1995-96)

Sub sector	Percent									
	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Crops and Vegetables	14.33	14.59	14.70	13.75	13.43	13.23	12.51	12.28	12.00	11.64
Livestock	3.12	3.02	2.95	2.96	2.93	2.91	2.95	2.92	2.88	2.79
Forestry	1.90	1.88	1.87	1.88	1.86	1.83	1.82	1.79	1.75	1.75
Fisheries	5.93	6.09	5.51	5.40	5.25	5.11	5.00	4.86	4.73	4.67

The current contribution of livestock sub- sector to overall GDP is about 2.73% which is 17.15% of agricultural GDP. The export earning from leather and leather goods is 4.31% of the total export, 20% of the population is directly and 50% is partly dependent on this sector (Draft SFYP-2009).

Table 3. Demand, supply and deficit of meat, milk, and eggs/person/year (2007-2008)

Products	Requirement	Available	Deficit	Percent of deficit
Meat (kg)	43.25	9.12	34.13	78.9
Milk (lt)	91.25	17.50	73.75	80.82
Eggs (No)	104	36	68	65.35

Source: FAO/APHCA (2008)

Present status of livestock

Livestock population in Bangladesh in 2007-08 was cattle 23 million, Buffalo 1.3 million. Goats 21.6, sheep 2.8 million, chicken 212.5 million and ducks 39.8 million (Bangladesh Economic Review-2009 and DLS). The per capita number of cattle was 0.16, goats 0.15, sheep 0.01, chicken 1.47 and ducks 0.27 (Table 4).

Table 4. Number of domestic animal (2002–2008)

Million numbers

Types of animal	2002-03		2003-04		2004-05		2005-06		2006-07		2007-08	
	No	No /head	No	No /head	No	No /head	No	No /head	No	No /head	No	No /head
Cattle	23.5	0.18	23.7	0.17	23.8	0.17	24.0	0.17	24.0	0.16	24.2	0.16
Cows	22.5	0.17	22.6	0.17	22.7	0.16	22.8	0.16	22.9	0.16	22.9	0.16
Buffaloes	1.0	.001	1.1	0.001	1.1	0.001	1.2	0.001	1.2	0.001	1.3	.001
Goats	17.7	0.13	18.4	0.13	19.2	0.13	19.9	0.14	20.8	0.14	21.6	0.15
Sheep	2.30	0.09	2.4	0.01	2.5	0.01	2.6	0.01	2.70	0.01	2.8	0.01
Chicken	162.4	1.24	172.6	1.3	183.4	1.33	194.8	1.39	206.9	1.45	212.5	1.47
Ducks	35.4	0.27	36.4	0.27	37.3	0.27	38.2	0.27	39.1	0.27	39.8	0.27
Total poultry	198.0	1.52	209.0	1.57	220.7	1.60	233.0	1.66	246.0	1.72	252.3	1.74

Source: DLS 2009 and Bangladesh Economic Review 2009

Bangladesh has one of the highest densities of livestock in the world, 145 large ruminants/km² compared with 90 for India, 30 for Ethiopia and 20 for Brazil.

Despite the highest density of cattle population in Bangladesh the productivity of all the species is far below the world average. Milk yield per head per lactation is 206 kg against the Asia average of 1220kg, India-1014 kg and Pakistan 1179kg (FAO-2005) (Table 5).

Average weight of local cows ranges from 125-150kg, bulls 200-250kg that falls 25-35 short of the average weight of all purpose cattle in India. Average body weight of goats is 8 kg, sheep 10 kg, buffalo 150kg (DLS-2009)

Table 5. Milk yield per cow (kg) per year of selected countries of Asia

Country	Yield in kg
Asia Av.	1220
India	1014
Bangladesh	206
Pakistan	1179

Source: FAO - 2005

Table 6. Productivity of different livestock species in terms of milk, meat and eggs in 2007-08 in Bangladesh

Milk	No. of Cows ,000	Production mmt	Unit production
Cross bred	742	1.5	2016kg/lact
Indigenous	3380	0.95	280 kg/lact
Milch buffalo	227	0.180	793 kg/lact
Milch goat	2587.2	0.027	10.5kg/lact
Meat			
Indigenous cattle	3664	0.293	80kg/cattle
Imported cattle	139	0.252	150kg/
Buffalo	139	0.018	130kg/buffallo
Goat	8193	0.082	10kg/goat
Sheep	917	0.009	10kg/sheep
Chicken	335703	0.336	1kg/chicken
Duck	49800	0.050	1kg/duck
Egg		Million No.	
Large scale layer	7530	1731.8	230eggs/year
Medium scale farm	13726	2745.1	200eggs/year
Indigenous Chicken	21239	326.6	41eggs/year
	Total	5653.2	

Source: DLS, 2009

About 89% of rural household rear poultry and the average number of birds per household are 6.8, supply 20.8% of the country's total egg and 37.3% of meat (BBS-2009).

Table 7. Trends in production of fish, Meat, Milk and Egg : 2001-2008

Year	Fish (mil.tons)	Meat (mil.tons)	Milk (mil.tons)	Egg (mil.tons)
2001-02	1.89	0.78	1.78	4424
2002-03	1.99	0.83	1.82	4777
2003-04	2.10	0.91	1.99	4780
2004-05	2.22	1.06	2.14	5623
2005-06	2.33	1.13	2.27	5422
2006-07	-	1.03	2.28	5370
2007-08	-	1.04	2.65	5603

Source: Bangladesh CPP on Food Security, 2007 and BBS, 2009

The productivity of local hen is 40-60 eggs per bird per year, the mortality is high mainly due to incidence of infectious diseases, whereas commercial layers produce 79% of the total egg and broiler birds produce at a FCR of 2:1.

The low productivity of local livestock species is the resultant effect of low genetic potentialities, poor nutrition, disease control and management practices in addition long calving interval and a late age at puberty in case of large ruminants.

To develop environment-friendly and sustainable livestock production system it is essentially needed to increase the productivity of per livestock unit through improvement in the genetic potentialities, ensured better nutrition and good health management practices resulting an increase in the quality rather than in numbers.

Although an upward trend in the production of meat, milk and egg from 2001—2008 is evident from the Table 7., the per capita availability of meat 20gm/day, milk- 51ml/day and 40 eggs/year in the year (2007-08, DLS). Total production in the years 2002-2008 as shown in Table 7 was milk 1.82- 2.65 million ton at a growth rate of (145.6%), meat 0.91 – 1.04 million ton at a growth rate of (114.3%), and eggs—4770-5653 million numbers at a growth rate of (118.5%).

Table 8. Yield Potentialities of Livestock Products and per-head availability in Bangladesh

		Mill. Tons/no	Contribution of each sp %	Per-head availability in kg/year	Per head /day in gm
M I L K	Total	2.65		18.2	50.
	Cows (Cross bred)	1.5	56.60	10.3	
	Local	0.95	35.85	6.51	
	Buffalo	0.15	5.66	1.03	
	Others	0.05	1.89	0.34	
M E A T	Total	1.04		7.13	20.0
	Local cattle	0.29	27.88	2.00	
	Imported	0.25	24.04	1.70	
	Buffalo	0.02	1.92	0.14	
	Goat	0.08	7.69	0.55	
	Sheep	0.01	0.96	0.07	
	Chicken	0.34	32.69	2.33	
	Ducks	0.05	4.81	0.34	
E G G S	Total mill.nos.	5653.10		38.74	0.11
	Local	849.5	15.03	5.82	
	Commercial	4477.0	79.20	30.7	
	Ducks	326.6	5.78	2.23	

Source: BBS and DLS (2009). Population in 2008, 145.93 million.

Table 9. Projected demand and supply of livestock food products upto year 2030, taking into consideration the projected population growth. BBS -2009

	2008			2010			2015		
	Demand	Available	Deficit %	Demand	Target Pro.	Deficit %	Demand	Target Pro.	Deficit %
Milk mil.ton	13.3 (250ml /head/day)	2.65 (50ml/ head/day)	80.0	13.5 (250ml /head/day)	2.8 (51ml/head /day)	79	14.5 (250ml/head/ day)	3.44 (59.3ml /head/day)	76
Meat mil.ton	6.3 (120gm /head/day)	1.1 (20.6gm/ head/day)	82.5	6.5 (120gm/ head/day)	1.3 (24.2gm /head/day)	80	6.96 (120gm/head /day)	1.56 (27.0gm /head/day)	78
Egg mil.No.	15174 (104/head/ year)	5653 (38.74/ head/year)	63	15376 (104/ head/year)	6997 (47.33/head /year)	35.6	16527 (104/head/ year)	8479 (50/head /day)	49

	2020			2025			2030		
	Demand	Target Pro.	Deficit %	Demand	Target Pro.	Deficit %	Demand	Target Pro.	Deficit %
Milk ml./ton	15.5 (250ml /head/day)	4.8 (77.6ml/ head/day)	69	16.4 (250ml /head/day)	8.67 (132ml/ head/day)	47	17.5 (250ml /head/day)	15.6 (225ml /head/day)	11
Meat ml./ton	7.4 (120gm/ head/day)	2.5 (40gm /head/day)	67	7.9 (120gm/ head/day)	4.24 (64.5gm /head/day)	47	8.3 (120gm/ head/day)	7.2 (104gm /head/day)	14
Egg ml. No.	17628 (104/ head/year)	13867 (82/ head/year)	23	18740 (104/ head/year)	18027 (112.5 /head/year)	3.8	19750 (104/ head/year)	19829 (104 /head/year)	0

Source: BBS (2009) Projected population 2008, 145.93 million; 2010, 147.86million; 2015, 158.96 million; 2020, 169.54 million; 2025, 180.21 million; 2030, 169.85 million.

Demand and supply gap is more as is evident from Table 9. As per FAO estimates the demand and availability of milk, meat and egg for the country in the Year 2007-08, it is evident that there is a deficit of (80%) in milk, 82% in meat and 63% in eggs.

Table 10. Projected demand and availability of milk, meat and egg taking the nutritional requirement and projected population growth in consideration

	Demand and	Production (2008-09)	Demand and	Production (2010-11)	Demand and	Production (2014-15)
	Demand	Production achieved	Demand	Production Target	Demand	Production Target
Milk MMT	13.15 (250ml /person/day)	2.286 (44ml /person/day)	13.49 (250ml /person/day)	2.752 (51ml /person/day)	14.18 (250ml /person/day)	3.63 (64.15ml /person/day)
Meat MMT	6.31 (120gm /person/day)	1.084 (20.6gm /person/day)	6.47 (120gm /person/d)	1.30 (24.18gm /person/d)	6.80 (120gm /person/d)	1.74 (30.66gm /person/d)
Egg Mill. No.	14997 (104/ person/y)	4696 (33/person /yr)	15376 (104/ person/y)	6997 (47.33 /person/y)	16169 (104/person/y)	9505 (61.15/yr /person)

Source: Projected figures of BBS, Economic Review-2009 and DLS, 2009

Projected population figure of 2008-09 as 144.20 million, 2009-10 as 146.02million, 2010-11 as 147.85 million, 2011-12 as 149.72million, 2012-13 as 151.60million, 2013-14 as 153.52 million, and 2014-15 as 155.45 million (Gr-1.26%).

SFYP and DLS projected the requirement and availability of livestock products up to 2021 as shown in Table 10. In the projected estimates it was shown that an increase in the production of milk 158% in the year 2013 and 225% in the yr. 2021; meat 397% in the yr. 2013 and 168% in the yr 2021; egg 274% in the yr. 2013 and 114.9% in the yr. 2021 from the base line year 2008.

If this production estimate can be achieved 100% then there will be self sufficiency in egg and slightly below in case of milk and meat.

It is assumed that 30 million people consume less than 1900 Kcal per capita per day as against 2300Kcal; 47million still live below the poverty level (The Human Development Report-1998). In comparison to US and World average consumption of milk, meat and egg per person per year it will be seen that Bangladesh remains far below than US- 117.3, 124 and 14.5 kg and World average 46.4, 37.9 and 8.0 kg respectively (SFYP 2009).

In the present paper the projected estimates for requirements and production of milk, meat and egg is shown in Table 9. At the present production status Bangladesh has a shortage of milk, meat and egg 80,84 and 63% of the total requirement of the country..

To achieve the projected demands for milk, meat and eggs strategic plans will have to be required to have 1.3- 1.5 times increase in the production in the years 2015 and 2020 from the base line yr.2008 and in the years 2020 and 2030 an increase of 1.5 – 1.8 times as shown in Table 9.

Table 11. Annual Development Budget Allocation to DLS and BLRI (in million Tk)

Year	Allocation to DLS	Annual Budget	Percentage	Allocation to BLRI	Percentage
2001-02	1189	160000	0.74	14.800	0.009
2002-03	1170	171000	0.68	17.745	0.01
2003-04	1108	190000	0.65	33.485	0.018
2004-05		205000		24.113	0.012
2005-06		215000		n.a	n.a.
2006-07	2200.3	216000	1.00	65869.0	.030
2007-08	2393.9	225000	1.06	66007.0	0.03

Source: DLS and BLRI, 2009

Despite great potentialities in the sub- sector due emphasis was not given in the past years which is evident from the declining trend in the budget allocation from 0.52% in the year 2001-02., 0.46 in 2002 – 03, 0.38% in 2003 -04...

Review of the past Plans

Since its inception BARC developed a few Strategic Research Plans. It is necessary to review and analyze the action plans and achievements which may guide to formulate future research plan. Research Plans (194- 89) and 1995 were reviewed.

In the previous plans food production was defined only cereal grains mainly emphasized on rice production later on crop diversification was meant in addition to rice other crops such as oil seeds and pulses and other agricultural crops but animal agriculture was not considered.

Strategic Plan for National Agricultural Research System to the 2010 and beyond (1995) set the following objectives production and productivity by:

- a. Genetic upgrading of local stocks;
- b. Provision of efficient disease control system; and
- c. Provision of effective feed and feeding system.

Increase the supply of animal products- meat, milk, eggs, hides and skin for domestic consumption and export.

Maximize the utilization of by-products, residual and waste materials of other wise little worth by converting them into milk, meat and other useful products by ruminant animals.

Explore new animals and birds, which are now little known or underutilized for possible source of food and other useful products and make efforts for their farm scale production.

Supplement draft power requirement with improved nutrition, management and better veterinary coverage for a short term scenario.

Generate technologies for storage, preservation and processing of livestock products to improve quality standards determined by consumer preference and products competition in the market place.

Strengthen the commercial base of the livestock industry by implementing appropriate policies on trade and tariff regime, import regulations, local subsidies, and credit to attract private investment.

Undertake innovative research to increase reproductive efficiency of livestock, develop diagnostic reagents like monoclonal antibodies, and increase nutrient utilization by ruminants. Strengthen research, education and extension linkage.

To ensure local and national food security Bangladesh Climate Change Strategy and Action Plan -2008 emphasized farming system comprising cropping, livestock and fisheries, and formulated the following strategic action relevant to the development of livestock sub sector.

- a) Promote small, medium and large scale dairy and poultry farming on commercial basis through providing technical, financial, infrastructure and marketing support.
- b) Strengthen livestock R & D for development of quality breeds including genetic stock development.
- c) Establishment of forage bank in drought hit areas to mitigate livestock feed shortage.
- d) Protection of livestock and poultry from disasters particularly cyclone and flood.
- e) Development of stress tolerant livestock and poultry strains to cope with climate change.
- f) Provision of adequate livestock health care services for disease control including supply of adequate medicine and vaccine.
- g) Development and protection of family/private farm poultry production, goat raising and beef fattening. Dissemination of scientific knowledge about animal husbandry among community.

- h) Institutional capacity building of the Department of Livestock Services (DLS) with adequate budgetary provision and logistics.

The draft SFYP (2011- 2015) recommends the following objectives to provide the enabling environment, opening up opportunities, reducing risks and vulnerability for harnessing the full potential of livestock sub-sector to accelerate economic growth for reduction of rural poverty in which the private sector will remain the main actor, while the public sector will play a facilitating and supportive role.

Objectives:

1. To promote sustainable improvements in productivity of milk, meat and egg production including processing and value addition.
2. To promote sustained improvements in income, nutrition and employment for the landless, small and marginal farmers; and
3. To facilitate increased private sector participation and investments in livestock production, livestock services, market development and export of livestock products and by- products.

Targets:

Achievable goals of livestock sub-sector under Vision 2021; Bangladesh for Resolution of Crisis and a Prosperous Future”

1. To meet the demand of standard nutrition for 85% of the population the per capita availability of milk, meat and egg will be raised to 150 ml daily, 110 gm daily and 104 pieces per year respectively.
2. To achieve the goal of reducing number of unemployed people to 2.4 crore instead of 2.8 crore by 2013 and to 1.5 crore by 2021 and creation of direct job opportunities for 112 lakh people
3. The livestock sub-sector will be supportive toward reduction of poverty and extreme poverty 25% and 15% respectively
4. The use of information technology in livestock service delivery will be increased significantly to achieve the goal for developing digital Bangladesh
5. To increase the income of the poor people and enhance food security through implementing one house one farm model.

Problems/Constraints

Having reviewed the available reports, publications and interactions with different stakeholders the following problems/constraints have been identified for the lowest productivity of all the livestock species in comparison to that of the developed and neighboring countries.

1. Breeds

- a) Lack of appropriate/suitable breed of different livestock species and breeding materials.
- b) Infertility, long calving interval and late age at maturity

- c) Lack of conservation of potential genetic resources
- 2. Feeds**
- a) Shortage of feeds and fodder in respect of both quality and quantity
 - b) Shortage of lands for fodder cultivation
 - c) High feed price
 - d) Shortage of high quality fodder germplasm
 - e) Lack of appropriate processing and conservation technology for feeds and fodder.
- 3. Livestock Diseases**
- a) Poor/lack of epidemiological information about major livestock and poultry diseases
 - b) Limited veterinary services, including poor disease diagnostic facilities
 - c) Poor/Lack of strategic disease control programs including disease information system
 - d) Serious shortage or lack of manpower in veterinary or disease research in BLRI, currently this is a major obstacle to control disease problem in livestock production
- 4. Livestock Health Management**
- a) Absence of animal quarantine services in the ports
 - b) Lack of appropriate herd health management system
 - c) Lack of appropriate bio-security system
 - d) Improper implementation of waste management system
 - e) Disease control Act, Quarantine Act, Fisheries and Livestock Feed Act are still not implemented
 - f) Lack of Slaughter Act
 - g) Lack of wet market regulations
- 5. Vaccine**
- a) Lack/shortage of quality vaccines against major livestock and poultry diseases
 - b) Lack of thermostable vaccines.
 - c) Poor/lack of vaccine research in BLRI / LRI
- 6. Quality control**
- a) Lack of quality control measures for vaccines, drugs, biologics, breeding materials, etc.
 - b) Lack of quality control measures for livestock products and bi-products
 - c) Poor/Lack of preservation techniques for livestock products and bi-products
- 7. Management/Marketing**
- a) Lack of systemic marketing net work for live livestock and their products
 - b) Lack of quality value added products in the market
 - c) Lack of adequate infrastructure to the expansion of trade and investment in the sector

Research Areas

Having analyzed the current livestock production and research status, and the problems faced by the farmers the following research areas have been suggested.

Research Area 1: Epidemiology/Surveillance of Livestock Diseases

1. Epidemiology and surveillance of major important diseases of ruminants.
2. Epidemiology and surveillance of major important diseases of poultry.
3. Epidemiology and surveillance of zoonotic diseases.

Research Area 2: Characterization of Etiologic Agents of Livestock Diseases by Conventional and Biotechnological Approach

1. Characterization of the etiological agents of economically important diseases of ruminants.
2. Characterization of the etiological agents of economically important diseases of poultry.
3. Characterization of the etiological agents of zoonotic diseases.

Research Area 3: Diagnosis and Diagnostics

1. Development of diagnosis systems and diagnostics.
2. Development or adoption of molecular biotechnological techniques for diagnosis of different diseases.
3. Development or adoption of serological techniques for diagnosis of different diseases.
4. Development of new cost-effective and rapid diagnosis systems and diagnostics against different diseases.
5. Cell culture techniques for diagnosis of viral diseases and vaccine production

Research Area 4: Therapy, Prevention and Control of Livestock Diseases

1. Development of new treatment system.
2. Development of herbal drugs and treatment.
3. Development of drugs and other therapeutics.
4. Development of appropriate herd health management system.
5. Studying host immune responses against pathogens.
6. Studying the biology of animal reproduction and disorders of reproduction, and adoption of biotechnological tools for assisted reproduction.
7. Evaluation of hazardous toxic compounds for their harmful effects on animal health and development of measures for mitigation.
8. Development of zoo-sanitary and bio-security for farm animals and poultry.
9. Development of prevention, control and eradication measures for different livestock diseases.

Research Area 5: Biologics and Vaccine Biotechnology

1. Development of vaccines and biologics against important diseases of ruminants and poultry using conventional and molecular biotechnological approaches.
2. Development of thermostable vaccines.

Research Area 6: ICT for Livestock Health and Production

1. Establishment of databank for bacterial, viral, fungal, parasitic, mycoplasmal and other diseases prevalent in livestock and poultry in Bangladesh.
2. Establishment of databank for livestock production with feeding information.

Research Area 7: Animal Genetics, Breeding, Conservation and Improvement

1. Characterize, conserve and improve different productive type of indigenous livestock and poultry through improved scientific means.
2. Studies on immunogenetic status of livestock and poultry in Bangladesh.
3. Develop assorted beef and dairy breeds suited to the local environmental conditions.
4. Develop disease resistant HYV of livestock and poultry.
5. Genetic evaluation of indigenous and cross bred livestock and poultry for productivity in specific agro-ecological conditions.
6. Develop livestock and poultry varieties or line for harsh/inclement environment like cyclone, salt, flood and draught.

Research area 8: Nutrition, Feed biotechnology and Housing

1. Commercial herbal feed additives for ruminants
2. Commercial manufactured feed from agro based and other wastes
3. Commercial beef meat production
4. Protected protein concentrates for ruminants
5. Feed information and feeding standard for growing and beef animal and milking cows
6. Commercial probiotic or direct fed microbes (DFM) and prebiotics for beef meat and milk production
7. Beef starter and finisher feeds
8. Commercial milk replacer and calf starters
9. Develop feeding standards for different species of livestock and poultry at different production stages.
10. Feed toxicity determination and evaluation of their residual effects
11. Commercial prebiotic and probiotic development for calves, growing, lactating and beef cattle and buffalo
12. Herbal feed premixes for calves, growing, lactating and beef cattle and buffalo
13. Enzyme feed premixes for cattle and buffalo
14. Development of manufactured feed compositions using potential and public health friendly agro-industrial wastes and by-products
15. Searching plants and their extracts to combat invidious position of antibiotic and chemical feed additive use for milk and meat production
16. Modeling beef productions matching with available feed resources
17. Feed preservation and processing and quality management system development
18. Development of regional feed information and large animal feeding systems
19. Development of nutritional therapy for calf and lactating animal disorders
20. Nutritional management of livestock and poultry for productivity and environmental issues.
21. Develop techniques for improving utilization of agro-industrial by-products as high quality livestock feed such as straw, bagasse, meat offals, leather trimmings and shavings, pineapple, citrus fruits wastes etc.

22. Develop appropriate technology for the utilization of NCFR such as algae, duck weed, water hyacinth, silk worm pupae, tree leaves herbs and shrubs.
23. Mapping of nutrient status in feeds and livestock species Upazilla wise.
24. Studies on nutrition- reproduction interaction at different reproductive stages of livestock and poultry.
25. Develop appropriate and effective housing for sheep, goat and poultry.

Research area 9: Feeds and Fodder

1. Established forage germplasm bank of both exotic and native types
2. Increased green grass availability at farm level
3. Tissue culture technique for forage crop seed production and distribution
4. Establishment of private fodder nurseries
5. Increased availability of forage crop seeds/cuttings to farmers of different regions and seasons
6. Introduction of multipurpose forage crop into cropping system
7. Development of salt, draught and flood tolerant forage crops
8. Genetic manipulation of forage crop for higher nutritive value and/or biomass yield
9. Biotechnological and mechanical manipulation of forage preservation systems
10. Characterize, conserve and improve HYV fodder species suited to Bangladesh environment.
11. Develop suitable fodder/forage crops in the forest lands, tree plantations, fruit plantations, sugar cane areas, haors, baors, roadsides and bund areas.
12. Develop region specific feeding system for different productive functions of different species incorporating available feeds and fodder in the area.
13. Fodder germplasm conservation, improvement and forage production technology.
14. Develop data base on the chemical composition and nutritive value of feeds and fodder species at different seasons of the year under different cropping and production system.
15. Develop cropping system incorporating appropriate fodder species in the existing cropping pattern.

Research area 10: Safety, Quality Improvement and Control

1. Livestock products, value added products and bi-products
2. Feeds, fodder and forages
3. Vaccines, biologics, drugs and diagnostics
4. Livestock seed materials (male, semen, embryo, chicks, etc.)

Research area 11: Livestock Biodiversity and Conservation

1. Characterization and conservation of indigenous species
2. Conservation of endangered species
3. Zoo-animals

Research Area 12: Socio-economic and management

1. Develop models for livestock production system commensurate with the existing topography and farming system.

2. Economic studies on the losses accrued due to the incidence of recurrent and emerging diseases in livestock.
3. Identify economically viable livestock health and production technology for large and small farm entrepreneurs.
4. Economic studies of feeds and fodder production including price policy.

Research Area 13: Processing, preservation and marketing of livestock products, bi-products and value added products

1. Develop appropriate marketing system for live livestock and their products and bi-products.
2. Develop suitable processing, preservation technologies for livestock products and bi-products.
3. Studies on the efficacy of value added livestock products.

Research Area 14: Waste management and Pollution Control

1. Develop appropriate environment friendly livestock waste management system
2. Develop bio-gas production technology and generation of electricity.
3. Develop suitable bio-fertilizer mixture using livestock and poultry manure appropriate for different crops.
4. Develop ways and means to alleviate methane emission and control the atmospheric pollution.

Research Area 15: Climate change

1. Climate change due to the accumulation of gasses such as carbon dioxide, methane, CFC, marsh, and other gasses in the atmosphere definitely affects the man and his well being. Out of the gasses methane mainly arises out of the anaerobic fermentation of carbohydrate fractions in the rumen and paddy fields. Methane gas contributes about 18% of the global warming effect where animal agriculture contributes to a small degree. Large ruminants produce major portion of methane in the rumen when the animals are fed on low quality roughages. A feeding strategy supplementing the low quality roughage diet by high quality feed nutrients can improve the efficiency of roughage utilization and can reduce methane production per unit of feed up to 50% (Leng, 1982).

Commodity wise Research Priority:

Inadequate and disproportionate food production and its supply and distribution are the major contributors of chronic energy deficiency, protein-energy mal-nutrition, macro and micro nutrient deficiency of different age and productive function groups of the people of the country. Balanced food production and distribution according to the nutrient need of the people is a great challenge for the vision document 2030 and beyond which should be addressed through well designed integrated food production research programs.

Essentially the research plan and vision 2030 and above is an attempt to significantly improve the nutritional status of the people and to alleviate the poverty, and thereby, contribute to the improvement in the quality of life and socio-economic development.

A need for stepping up research support to achieve the national requirement for food of animal origin should be earmarked in the SFYP.

The use of genetically programmed bacteria, yeast and tissue cells are promising avenues for producing safe, more potent and less costly vaccines the potentiality of which was felt seriously due to the recent incidence of avian influenza, swine influenza, causing death to livestock and human being.

Potential non-conventional feed resources may be profitably used in formulating complete rations for livestock and poultry based on their availability, quality and utility in individual animal species. There is a need to prepare a detailed inventory for non- conventional feed resources in different regions of the country. More studies on the incriminating agents limiting the utilization of nutrients and methods for removing them are required. There is also a need for concerted effort to apply available knowledge to large scale farm testing.

Commodity-wise the following research programs are identified as high, medium and low.

Large Ruminants (Cattle and Buffalo)

Problem specification	Location	Magnitude %	Extent of severity	Rank
Baseline survey on the productive performances of cattle and buffalo at all stages of productive life in Bangladesh.	All through Bangladesh	100	10	H
Animal Genetics, Breeding, Conservation and Improvement of Animal Genetic Resources (AnGR)				
Conservation and development of potential native animal genetic resources through social entrepreneurship development	Do	80	8	H
QTL studies for economic traits in cattle and buffalo.	Do	60	6	M
Database mapping of characterized and documented cattle genetic resources	Do	80	8	H
Studies on the genetic variability for disease resistance to infectious diseases and parasites in livestock and identification of genes related to diseases.	Do	60	6	M
Genetic manipulation for microbial fermentation of rumen products in ruminants.	Do	50	5	L
Detection and eradication of hereditary diseases and genetic disorders in breeding animals.	Do	50	5	L
Immuno-genetic status of indigenous cattle and buffalo.	Do	50	5	L
In situ conservation and improvement of rare and endangered livestock species.	Do	70	7	M
Cryo-preservation of rare and endangered livestock	Do	70	7	M

species.				
Evaluation of existing AI service in the field and determination of factors affecting infertility in cattle and buffalo.	Do	90	9	H
Studies on the hormone profile in the cyclic and pregnant indigenous and cross-bred cows in relation to fertility.	Do	50	5	L
Screening the breeding males for breeding soundness, infectious and genetic diseases.	Do	80	8	H
Development of low cost technology for maintaining cold chain AI service	Do	70	7	M
In-vitro culture and fertilization of embryos in livestock.	Lab.	60	6	M
Standardization of embryo transfer technology for livestock in Bangladesh	Lab.	70	7	M
Development of animal registration and recording system through formation of breed societies.	All through Bangladesh	60	6	M
Production of seed stock for economically important indigenous livestock.	D0	70	7	M
Genetic evaluation of indigenous and cross-bred livestock for productivity and fitness in specific agro-ecological condition.	Do	80	8	H
Development of livestock varieties or line for low input management system.	Do	70	7	M
Development of livestock varieties or line for harsh environment like cyclone, flood and draught.	Do	70	7	M
Assorted dairy cattle breed development and production.	Do	80	8	H
Assorted beef cattle breed development and production.	Do	80	8	H
Assorted buffalo breed development and production.	Do	80	8	H
Production of seed stock for rare and endangered livestock.	Do	70	7	M
Development of HYV of dairy and beef animals for feed lot system or medium input system.	Do	80	8	H

Nutrition, feed biotechnology, Feeds and Fodder and Housing				
Commercial herbal feed additives for ruminants	All through Bangladesh	60	6	L
Commercial manufactured feed from agro based and other wastes	Do	70	7	M
Protected protein concentrates for ruminants	Do	80	8	H
Feed information and feeding standard development for growing, beef and dairy cattle and buffalo	Do	80	8	H
Commercial probiotic or direct fed microbes (DFM) and prebiotics for beef and milk production	Do	70	7	M
Beef starter and finisher feeds	Do	80	8	H
Commercial milk replacer and calf starters	Do	80	8	H
Commercial prebiotic and probiotic development for calves, growing, lactating and beef cattle and buffalo	Do	70	7	M
Herbal feed premixes for calves, growing, lactating and beef cattle and buffalo	Do	70	7	M
Enzyme feed premixes for cattle and buffalo	Do	70	7	M
Development of manufactured feed compositions using potential and public health friendly agro-industrial wastes and by-products	Do	80	8	H
Searching plants and their extracts to combat invidious position of antibiotic and chemical feed additive use for milk and meat production	Do	80	8	H
Modeling beef productions matching with available feed resources	Do	80	8	H
Feed preservation and processing and quality management system development	Do	80	8	H
Development of regional feed information and large animal feeding systems	Do	80	8	H
Development of cost-effective complete feed formulations for cattle and buffalo for different productive functions.	Do	80	8	H
Establishment of Fodder Research and training Centre	Do	80	8	H
Characterize, conserve and improve HYV fodder species suited to Bangladesh environment	Do	80	8	H
Establish forage germplasm bank of both exotic and native types	Do	80	8	H
Increase green grass availability at farm level	Do	80	8	H
Tissue culture technique for forage crop seed production and distribution	Do	80	8	H
Establishment of private fodder nurseries	Do	60	6	L
Increased availability of forage crop seeds/cuttings to farmers of different regions and seasons	Do	70	7	M
Introduction of multipurpose forage crop into cropping system	Do	90	9	H
Development of salt, draught and flood tolerant forage crops	Do	90	9	H
Development of submergence tolerant fodder varieties	Do	80	8	H

Mapping of nutrient status in feeds and livestock species Upazilla wise	Do	60	6	M
Develop cropping system incorporating appropriate fodder species in the existing cropping pattern	Do	80	8	H
Develop suitable fodder/forage crops in the forest lands, tree plantations, fruit plantations, sugar cane areas, haors and baors, roadsides and bund areas.	Do	90	9	H
Studies on nutrition- reproduction interaction at different reproductive stages of livestock and poultry	On-station	80	8	H
Biotechnological and mechanical manipulation of forage preservation systems	All through Bangladesh	80	8	H
Develop data base on the chemical composition and nutritive value of feeds and fodder species at different seasons of the year under different cropping and production system.	Do	90	9	H
Develop region specific feeding system for different productive functions of different species incorporating available feeds and fodder in the area.	Do	60	6	L
Develop techniques for improving utilization of agro-industrial by-products as high quality livestock feed such as straw, bagasse, meat offals, pineapple, citrus fruits wastes, etc.	Do	90	9	H
Develop appropriate technology for the utilization of NCFR such as algae, duck weed, water hyacinth, silk worm pupae, tree leaves, herbs and shrubs.	Do	90	9	H
Rural livestock entrepreneurship development through public-private partnership research, education and extensions	Do	90	9	H
Sustainable small holder dairying and healthy calf crops	Do	80	8	H
Dairy database map of the country	Do	70	7	M
Development of buffalo dairy system	Do	80	8	H
Development of heifer management system	Do	80	8	H
Development of low cost dairy and beef animal housing	Do	80	8	H
Epidemiology and Surveillance of Diseases				
Epidemiological study of babesiosis and anaplasmosis in cattle.	Do	80	8	H
Sero-surveillance of important public health significance (zoonotic) diseases.	Do	80	8	H
Epidemiology and surveillance of FMD.	Do	80	8	H
Epidemiology and surveillance of anthrax, HS, etc.	Do	80	8	H
Epidemiology and surveillance of campylobacteriosis and leptospirosis.	Do	80	9	H
Epidemiology and surveillance emerging cattle diseases like IBR, BVD, BSE, Paratuberculosis, bovine leucosis, etc.	Do	100	10	H
Surveillance programme for mastitis	Do	80	8	H
Identification of causes of high calf mortality specially in crossbreed cattle and buffalo and their mitigation measure	Do	80	8	H
Epidemiological studies on gastrointestinal parasitic	Do	70	7	M

infestation				
Epidemiological studies on skin disease	Do	80	8	H
Epidemiological studies on calf diseases	Do	80	8	H
Seasonal surveillance of gastro-intestinal nematode larvae in the pasture lands with fecal culture for nematode larvae	Do	80	8	H
Surveillance studies on reproductive diseases	Do	80	8	H
Surveillance studies on nutritional diseases and metabolic disorders.	Do	80	8	H
Characterization of etiologic agents of diseases by conventional and biotechnological approach				
Isolation, identification and molecular characterization of FMD, Rota and other viruses	Do	90	9	H
Isolation, identification and molecular characterization of the causal agents of anthrax, BQ, HS, etc.	Do	80	8	H
Diagnosis and Diagnostics				
Development or adoption of biotechnological tools including PCR, RT-PCR, RFLP, PCR-ELISA, etc. for diagnosis of different diseases	Do	90	9	H
Development or adoption of serological tests like ELISA, CFT, immunohistochemistry, FAT, RIA etc. for diagnosis of different diseases.	Do	90	9	H
Development of new cost-effective and rapid diagnosis systems and diagnostics against different diseases.	Do	70	7	M
Cell culture techniques for diagnosis of viral diseases and vaccine production	Do	80	8	H
Therapy, Prevention and Control				
Development of new cost-effective treatment systems against different diseases.	Do	80	8	H
Development of herbal drugs and treatment.	Do	80	8	H
Development of drugs and other therapeutics.	Do	80	8	H
Studying host immune responses against pathogens.	Do	80	8	H
Prevention and control of skin diseases	Do	80	8	H
Prevention and control of gastro-intestinal parasitic infestations	Do	70	7	M
Development of prevention, control and eradication measures for diseases of cattle and buffaloes.	Do	70	7	M
Development of preventive measures against nutritional diseases and metabolic disorders.	Do	80	8	H
Prevention and control of reproductive diseases.	Do	80	8	H
Development of nutritional therapies for controlling nutritional and metabolic disorders	Do	80	8	H

Biologics and vaccine biotechnology				
Development of a binary ethyleneimine (BEI) inactivated polyvalent foot and mouth disease (FMD) vaccine.	Do	100	10	H
Development of recombinant vaccine for important viral diseases like FMD, IBR, etc.	Do	70	7	M
Development of recombinant vaccine for important parasitic diseases like fasciola, etc.	Do	70	7	M
Development and use of baculovirus & other virus expression vectors for vaccine development	Do	100	10	H
Development of antiserum against different types of FMD virus	Do	80	8	H
Health Management				
Development of appropriate herd health management system	Do	80	8	H
Development of appropriate cost-effective zoo-sanitary and bio-security measures for farm animals.	Farm condition	80	8	H
Studying the biology of animal reproduction and disorders of reproduction, and adoption of biotechnological tools for assisted reproduction.	All through Bangladesh	80	8	H
Development of models and tools for community-based "Productivity Veterinary Services" for smallholders and marginal farmers.	Do	80	8	H
Development of reproductive health management system (Hormone assay, AI service quality & efficiency, ovulation synchronization, tools for predicting bull fertility, application of ultrasonography, color dopler, etc.)	Do	100	10	H
Reproductive biotechnology: MOET, in-vitro fertilization as breeding tools, embryo sexing, embryo cloning, etc.	Do	80	8	H
Studies on repeat breeding at farms and development of mitigation measures	Do	90	9	H
Molecular and immunological events in host-pathogen interaction	Lab. and on-station	70	7	M
Evaluation of hazardous toxic compounds for their harmful effects on animal health and development of measures for mitigation.	All through Bangladesh	80	8	H
Establishment of Foot and Mouth Disease Research Institute/Centre	Do	100	10	H
Small Ruminants (Goat and Sheep)				
Establishment of Goat and Sheep Research Institute/Centre	Do	100	10	H
Genetics, Breeding, Conservation and Improvement				
Characterization, conservation and improvement of indigenous sheep and goat genetic resources in Bangladesh.	Do	80	8	H

Synthetic meat type goat development for commercial chevon production	Do	100	10	H
Synthetic milk type goat development for commercial goat-milk production	Do	80	8	H
Synthetic meat type sheep development for commercial lamb/mutton production	Do	80	8	H
Development wool producing sheep breed Fine wool yielding sheep development for commercial wool production	Do	80	8	H
Phenotypic and genotypic characterization of Bengal goat and sheep	Do	70	7	L

Feeding, nutrition and housing of goat and sheep

Commercial pellet feed development for small ruminant farming	Do	80	8	H
Strategic supplementation of goat/sheep under subsistent farming conditions	Do	80	8	H
Strategic feeding program during flood and other natural inclimences for goat/sheep	Do	80	8	H
Development of milk replacer and energy booster for kid/lamb	Do	80	8	H
Development of commercial kid/lambs medicated concentrates	Do	80	8	H
Development of cost effective feeding system	Do	80	8	H
Development of feeding system for commercial sheep production in coastal area	Coastal area	80	8	H
Development of feeding standard	All through Bangladesh	80	8	H
In-utero nutritional manipulation of sheep and goat: improvement of progeny	Do	80	8	H
Rumen manipulation for maximizing microbial protein outflow	Do	80	8	H
Increasing the availability of dietary protein through reducing ruminal degradation.	Do	80	8	H
Development of effective housing system for goat and sheep	Do	80	8	H

Epidemiology and Surveillance of Diseases

Epidemiology and surveillance studies on viral diseases like PPR, goat pox, contagious ecthyma, etc.	Do	90	9	H
Epidemiology and surveillance studies on enterotoxaemia, etc.	Do	90	9	H
Surveillance studies on pneumonia in goat	Do	80	8	H
Studies on surveillance programme for mastitis	Do	80	8	H
Epidemiological studies on gastro-intestinal parasitic diseases	Do	80	8	H
Epidemiological studies on skin diseases	Do	80	8	H

Epidemiological studies on kid diseases	Do	80	8	H
Seasonal surveillance of gastro-intestinal nematode larvae in the pasture lands with fecal culture for nematode larvae	Do	80	8	H
Surveillance studies on reproductive diseases	Do	80	8	H
Surveillance studies on nutritional diseases and metabolic disorders.	Do	80	8	H
Characterization of etiologic agents of diseases by conventional and biotechnological approach				
Isolation, identification and molecular characterization of viruses like PPR, goat pox, contagious ecthyma, Rota viruses, etc.	Do	90	9	H
Isolation, identification and molecular characterization of the bacterial agents causing enterotoxaemia.	Do	90	9	H
Diagnosis and Diagnostics				
Development or adoption of biotechnological tools including PCR, RT-PCR, RFLP, PCR-ELISA, etc. for diagnosis of different diseases.	Do	90	9	H
Development or adoption of serological tests like ELISA, CFT, FAT, RIA, immunohistochemistry, etc. for diagnosis of different diseases	Do	80	8	H
Development of new cost-effective and rapid diagnosis systems and diagnostics against different diseases.	Do	80	8	H
Characterization of goat and sheep genome by molecular methods	Do	80	8	H
Therapy, Prevention and Control				
Development of new cost-effective treatment system against different diseases.	Do	80	8	H
Development of herbal drugs and treatment.	Do	80	8	H
Development of drugs and other therapeutics.	Do	80	8	H
Studying host immune responses against pathogens.	Do	80	8	H
Prevention and control of skin diseases	Do	80	8	H
Prevention and control of gastro-intestinal parasitic infestations	Do	80	8	H
Development of prevention, control and eradication measures for diseases of sheep and goat.	Do	80	8	H
Develop control model/package for the prevention and control of kid diseases				
Prevention and control of pneumonia in goat	Do	80	8	M
Development of preventive measures against nutritional and metabolic diseases.	Do	80	8	M
Prevention and control of reproductive diseases.	Do	80	8	H
Biologics and Vaccine Biotechnology				
Development of thermostable vaccines against PPR, goat	Do	90	9	H

pox, etc.				
Development of new vaccine seed viruses against PPR and goat pox.	Do	80	8	H
Selection of vaccine strain of contagious ecthyma virus and development of a vaccine against contagious ecthyma.	Do	80	8	H
Development of recombinant vaccines against viral, bacterial and parasitic diseases	Do	70	7	M
Selection of enterotoxaemia vaccine strain and Development of a killed vaccine/toxoid against enterotoxaemia.	Do	90	9	H
Development of recombinant vaccine against enterotoxaemia.	Do	70	7	M
Development of monoclonal antibody (Mab) against PPR, goat pox and ecthyma viruses.	Do	80	8	H
Health Management				
Development of appropriate herd health management system.	Do	9	9	H
Development of appropriate cost-effective zoo-sanitary and bio-security measures for farm animals.	Do	100	10	H
Studying the biology of animal reproduction and disorders of reproduction, and adoption of biotechnological tools for assisted reproduction.	Do	80	8	H
Development of models and tools for community-based “Productivity Veterinary Services” for smallholders and marginal farmers.	Do	80	8	H
Development of reproductive health management system (Hormone assay, ovulation synchronization, tools for predicting buck fertility, application of ultrasonography, color dopler, etc.)	Do	80	8	H
Reproductive biotechnology: MOET, in-vitro fertilization as breeding tools, embryo sexing, embryo cloning, etc.	Do	70	7	M
Molecular and immunological events in host-pathogen interaction.	Lab & On-station	70	7	M
Evaluation of hazardous toxic compounds for their harmful effects on animal health and development of measures for mitigation.	All through Bangladesh	80	8	H
Poultry				
Establishment of Poultry Research Institute/Centre	Do	100	10	H
Conservation of Poultry Genetic Resources and Breed development				
Development of breed/variety/strain of chickens for meat and egg production.	Do	80	8	H
Conservation and development of native chicken and duck.	Do	90	9	H
Development of duck breeds for meat and egg production.	Do	80	8	H

Development of meat type rabbit	Do	60	6	M
Poultry Feeding, Nutrition and Housing				
Development of feeding standard for poultry	Do	80	8	H
Development of mineral supplement for poultry	On-station	80	8	H
Development of protein concentrate for poultry	Do	80	8	H
Development of feeding and management strategies during stresses	All though Bangladesh	80	8	H
Development of database on composition of poultry feeds	Do	80	8	H
Supplementary feeding system during lean period for scavenging duck.	Do	80	8	H
Supplementary feeding system for scavenging chicken.	Do	80	8	H
Development of herbal feed additives and probiotics for poultry	Do	80	8	H
Development of effective housing system for poultry	Do	80	8	H
Epidemiology and Surveillance of Diseases				
Epidemiology and surveillance of important infectious and emerging diseases of poultry such as avian influenza, chicken infectious anemia, Marek's disease, Avian leucosis, Egg drop syndrom, Hydropericardium-hepatitis syndrome, etc.	Do	90	9	H
Epidemiology and surveillance of infectious bursal disease in poultry.	Do	90	9	H
Epidemiology and surveillance of duck plague in ducks.	Do	80	8	H
Epidemiology and surveillance of avian Newcastle disease.	Do	80	8	H
Epidemiology and surveillance of avian pox.	Do	80	8	H
Epidemiology and surveillance of Salmonellosis in poultry.	Do	80	8	H
Epidemiology and surveillance of Aspergellosis in poultry.	Do	80	8	H
Epidemiology and surveillance of infectious coryza in Poultry.	Do	80	8	H
Epidemiology and surveillance of mycoplasmosis in Poultry.	Do	90	9	H
Epidemiology and surveillance of Coccidia in poultry.	Do	80	8	H
Surveillance on stunting growth syndrom in broiler chickens	Do	90	9	H
Characterization of etiologic agents of diseases by conventional and biotechnological approach				
Isolation, identification and molecular characterization of viruses of poultry like avian influenza, Newcastle disease, fowl pox, chicken infectious anemia, Marek's disease, Avian leucosis, Egg drop syndrom, IBD, duck plague	Do	90	9	H

viruses, etc.				
Isolation, identification and molecular characterization of Salmonella and other bacteria in poultry.	Do	90	9	H
Isolation, identification and molecular characterization of the agents causing Aspergellosis and Infectious coryza in poultry.	Do	80	8	H
Isolation, identification and molecular characterization of mycoplasma organisms in Poultry.	Do	80	8	H
Isolation, identification and molecular characterization of <i>Eimeria spp.</i> in poultry.	Do	80	8	H
Diagnosis and Diagnostics				
Development or adoption of biotechnological tools including PCR, RT-PCR, RFLP, PCR-ELISA, etc. for diagnosis of different diseases.	Do	90	9	H
Development or adoption of serological tests like ELISA, FAT, RIA, immunohistochemistry, HA HI, etc. for diagnosis of different diseases.	Do	80	8	H
Development of new cost-effective and rapid diagnosis systems and diagnostics against different diseases.	Do	90	9	H
Therapy, Prevention and Control				
Prevention and control of important infectious diseases of poultry, like avian Influenza, IBD, mycoplasmosis, coccidia, etc.	Do	90	9	H
Development of control strategies for important infectious diseases of poultry, such as avian Influenza, IBD, mycoplasmosis, coccidia, etc.	Do	100	10	H
Development of vaccination schedule of different vaccines in both commercial and native chickens	Do	90	9	H
Utilization of medicinal plants for health and production.	Do	80	8	H
Studying host immune responses against pathogens	Do	80	8	H
Biologics and Vaccine Biotechnology				
Selection of IBD (Gumboro) vaccine virus strains for development of killed and live vaccines.	Do	100	10	H
Development of vaccine against Marek's disease.	Do	100	10	H
Development of vaccine against avian leucosis and Egg drop syndrome.	Do	80	8	H
Development of vaccine against chicken infectious anemia.	Do	80	8	H
Development of vaccine against mycoplasmosis.	Do	90	9	H
Development of thermostable vaccines against Newcastle disease, fowl pox, etc.	Do	90	9	H
Development of vaccine against coccidia.	Do	80	8	H
Development of recombinant vaccines against viral, bacterial and other diseases.	Do	70	7	M
Development of monoclonal antibody (Mab) against	Do	80	8	H

different viruses.				
Development and use of Fowl Adenoviral Vector Delivery System and other possible vector delivery systems for vaccine development.	Do	70	7	M
Health Management				
Development of appropriate cost-effective zoo-sanitary and bio-security measures for farm poultry.	Do	100	10	H
Molecular and immunological events in host-pathogen interaction.	Lab. & On-station	70	7	M
Molecular immunology and cytokine research in duck and chicken	On-station	70	7	M
Development of tools and methods for combating stresses	All through Bangladesh	80	8	H
Evaluation of hazardous toxic compounds for their harmful effects on animal health and development of measures for mitigation.	Do	80	8	H
Common to livestock health and production				
Livestock Products and By-products				
Development of hygienic and safe processing and preservation techniques of livestock products and by-products.	Do	100	10	H
Hygienic fresh milk and meat production and marketing	Do	80	8	H
Meat production and processing technology diversification	Do	80	8	H
Fermented commercial dairy products	Do	70	7	M
Development of alternate dairy products	Do	80	8	H
Commercial microbial cultures for different dairy products	Do	80	8	H
Development of effective and hygienic slaughter house management system	Do	80	8	H
Development of techniques to identify dead livestock meat.	Do	80	8	H
Safety, Quality Improvement and Control				
Quality improvement of local vaccine and drugs following OIE standard guidelines.	Do	100	10	H
Quality control of different vaccines, drugs, biologics and diagnostics available in Bangladesh.	Do	100	10	H
Quality control of livestock products and by-products.	Do	100	10	H
Quality control of feeds, fodder and forages	Do	100	10	H
Investigation of toxicants in livestock feeds and livestock products	Do	90	9	H
Feed toxicity determination and evaluation of their residual effects	Do	80	8	H
Quality control of livestock seed materials (male, semen, embryo, chicks, etc.)	Do	90	9	H

Screening of animal origin food for <i>Salmonella enteritidis</i>	Do	80	8	H
Development of laboratory diagnostic facilities to detect drug residues	Lab. condition	90	9	H
Tools and techniques for determination of drug residues and toxins in livestock products, by-products and feeds	Do	100	10	H
Evaluation of hazardous toxic compounds for their harmful effects on animal health and development with measures for mitigation.	All through Bangladesh	80	8	H
Waste management and pollution control				
Utilization of poultry wastes through recycling	Do	80	8	H
Development of appropriate environment friendly livestock waste management system	Do	100	10	H
Development of bio-gas production technology and generation of electricity.	Do	100	10	H
Development of suitable bio-fertilizer mixture using livestock and poultry manure appropriate for different crops.	On-station	90	9	H
Development of ways and means to alleviate methane emission and control the atmospheric pollution.	All through Bangladesh	90	9	H
Technology Transfer				
Dissemination of Livestock health and production technologies	Do	90	9	H
Farming Systems Research				
Training, Technology Testing & Demonstration, and Development of Farming System	Do	80	8	H
Accelerating technology transfer through GO-NGO-Farmer training, distribution of printed materials and mass media publicity.	Do	80	8	H
Adaptive trials and demonstration of newly developed technologies, continue adaptive trials and studies on integrated crop-livestock-fisheries components for sustainable income generation	Do	80	8	H
On-farm testing of newly emerged technology and socio-economic upliftment of the farmers through interventions into the existing farming system	Do	90	9	H
HILL RESEARCH				
Establishment of Hill Research Centre	Hill area	90	9	H
Conserve and improve the hill livestock species.	Do	90	9	H
Development of improved livestock breeds specific for hill regions.	Do	80	8	H
Development of improved and appropriate feeds and feeding systems for the hill species.	Do	80	8	H
Integrated research programs for developing suitable fodder species in hill areas.	Do	90	9	H
Surveillance of the diseases of livestock in hill areas.	Do	90	9	H

Development of disease control systems in hill farm animals.	Do	90	9	H
Socio-economics of livestock and poultry production and global market policy				
Livestock and Poultry Marketing Improvement				
Improvement of meat marketing system (Beef, mutton, chevon and broiler)	All through Bangladesh	90	9	H
Development of milk marketing system.	Do	90	9	H
Socio-economic impact analysis of livestock development programs				
Impact of micro-credit on goat production	Do	80	8	H
Impact of small-holding livestock enterprises on achieving PRS and millennium development goals	Do	80	8	H
Socio-economic impact analysis of livestock and poultry farming	Do	80	8	H
Impact of subsidies on livestock and poultry production	Do	70	7	M
Economic losses caused by coccidiosis	Do	80	8	H
Economic losses caused by FMD	Do	80	8	H
Economic losses caused by PPR and Goat-Pox	Do	80	8	H
Identification of the livestock and poultry technologies adopted by the farmers	Do	80	8	H
Impact of vaccine development for livestock and poultry production (IBD, PPR etc.)	Do	80	8	H
Impact analysis of forage crop introduction into cropping system	Do	80	8	H
Women's participation in livestock and poultry production and generation of income	Do	80	8	H
Socio-economy, entrepreneur's development, strengthening value chain for business development	Do	80	8	H
Livestock production and climate change				
Assessment of climate change effects on livestock production in different agro-ecological zones of the country and development of their mitigation technique	Do	100	10	H
Assessment of climate change effects on health and disease problems of farm animals	Do	100	10	H
Development of appropriate feeding strategy supplementing low quality roughage diet by high quality feed nutrients reducing the methane production.	Do	100	10	H

H: High, M: Medium, L: Low

CONCLUSION

Research Program areas identified in this document are not rigid but may be expanded as deemed necessary. These need to be implemented very carefully. Necessary fund allocation and timely release of the fund will help success of the research results. It is hoped that successful implementation of the research programs will help to achieve the animal food production set in the vision document 2030 and improve the nutritional standard of the population, improve the income of the farmers, increase employment opportunities and reduce poverty status of the country.

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