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Original Article

Evaluation of existing feed act and way forward to its development in Bangladesh

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A B S T R A C T

The study was conducted to evaluate present status and the gaps of the existing feed act and to recommend the output to the concerned policy makers of the Government of Bangladesh. Among the existing act, feed act was considered for investigation. Research gaps were addressed through published data, SWOT analyses, structured questionnaires survey, FGDs (Focus Group Discussions) and Key Informant Interviews (KIIs). The study was carried out in seven divisions of Bangladesh namely Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, Barisal and Rangpur. Total 237 representative samples (covering all stakeholders like farmers, dealers and distributors, Govt. officials, feed mill owners) were interviewed from selected seven divisions. Three FGDs and 50 KIIs were administered with different stakeholders. Descriptive statistics like percentage, mean, ranks, bar and pie chart were used for data analyses. Binary logistic regression and Z test were also used to identify the variables influencing the act. SPSS 20 software was used for data analyses. From the findings it reveals that the authority is not functioning properly due to lack of action plan and monitoring cell. Act itself faulty in respect of filing case with DLS permission, terms of punishment, nature of bail, lack of magistracy power of DLS officials, lack of feed and medicine analyses laboratory. Lack of enforcement of law for controlling adulterated, harmful, expiry dated feed, counterfeit labeling over the bag and maintenance of feeding standard and license. Lack of feed certification authority is visible. Act should be updated time to time to address the field based need. Farmers should get subsidy from Govt. Course curricula at university and school level should be restructured incorporating the livestock feed act. The use of growth promoters, hormone, tannery waste products and antibiotic in feed should be restricted. Mass media and Consumer Association of Bangladesh (CAB) should come forward to create awareness. The educated farmers have higher probability ($p<0.05$) of getting known to the feed act. Act should be implemented on step by step basis targeting a period. Govt. should enforce action plan by implementing acts considering organic and safe food showing zero tolerance to offenders. If policy is implemented ensured not only nutritional security, food safety and sustainable animal production but also livestock business and industry people will be benefitted and consumer will get safe food. Therefore, proper implementation of act will ensure the development of livestock and poultry sector in Bangladesh.

Introduction

Rapid growth in demand for livestock products in the developing countries is viewed as a "food revolution" (Upton, 2004). Livestock Department's available statistics show that the domestic production of milk, meat and egg are 3.74, 3.02, and 6745.28 million tons in the fiscal year 2014 against the demand of 14.55, 3.77, and 7544.67 million tons in 2015-16 million tons, respectively (Hossain and Hassan, 2013). It has been reported that in the Year 2007-08, it is evident that there is a deficit of 80% in milk, 82% in meat and 63% in eggs in Bangladesh (FAO, 2008). The livestock sub-sector that also includes poultry offers employment and livelihood opportunities. According to Bangladesh Economic Review (BER, 2006), the growth rate in GDP in the year

2004-05 for livestock was the highest of any sub-sector at 7.23%, compared to 0.15% for crops, and 3.65% for fisheries sub-sector (DLS, 2005; BER, 2009). These changes have been prompted by a rapid growth in demand for livestock products due to increase in income, rising population and urban growth. This sub-sector provides full time employment for about 2.5% and part time employment for 50% of the population, 3.67% foreign exchange earnings from hides & skins, cultivation of 50% of crop area, 50% of village transport, 80 million MT of manure to soil annually and 25% fuel supply of the country (BER, 2009). There is a huge gap between the demand and supply of nutritious foods for the human population. An adult people require at least 250 ml milk, 120 g meat daily, but supply is about 44 ml milk and 20.6 g meat per day (DLS, 2009) which indicates that we are in serious shortage of milk and meat. According to DLS report (2010), annual deficiency of milk, meat and egg is 82.28%, 80.22%, and 62.20%, respectively.

It is observed that livestock population (of all three main categories) declined for both the medium (2.50 - <7.50 acres) and large farms (7.50 acres and above) between 1996 and 2008. However, the dynamics is quite different for the marginal and small farms (<2.50 acres). Their stock not only increased but also displayed impressive growth (36.0 per cent for cattle and buffaloes, 28.4 per cent for goats and sheep, and 14.4 per cent for poultry over the same period). Moreover, for all three categories of livestock population, small and marginal farms continue to remain the dominant group in respect of possessing livestock population and contribution to their income.

The livestock sub-sector in Bangladesh is currently governed by the following legislation: Bengal Cruelty to Animals Act 1920, Prevention of Cruelty to Animals Ordinance 1962, Bangladesh Veterinary Practitioners Ordinance 1982, Animal Disease Act 2005, Bangladesh Animal and Animal Product Quarantine Act 2005, National Livestock Development Policy 2007, National Poultry Development Policy 2008, Avian Influenza Compensation Strategy and Guidelines 2008, Bangladesh Zoo Act 2009 (Draft), Animals Slaughter and Meat Control Act 2011, Fish Feed and Animal Feed Act 2010, National Livestock extension policy 2012 (http://www.dls.gov.bd/livestockdevpolicy.php).These pieces of legislation will continue to be updated from time to time in accordance with the policy changes and production trends. In any given country, it is the role of a Government Ministry to develop appropriate policy guidelines for development of the sector the Ministry is involved in. However, development of such policies must involve all the key stakeholders for the guidelines to adequately address real problems and the gaps that hinder the development of a sector.

In spite of having increased production of animal protein the consumers are not getting safe food as well as the animal industrialists cannot export their products as per World Trade Organization (WTO) regulations. The dynamic potential of this emerging sub-sector thus requires critical policy attention. The promotion of national food security is to meet up nutritional requirements and to increase the quantity and quality of livestock and livestock products as raw materials for local industries as well as for the purpose of export. To safeguard consumer's production and promotion of safe food is noteworthy. Implementation of policies and strategies is a crying need for the government of Bangladesh to stimulate livestock production, promote exports, safeguard domestic industries and protect both domestic and foreign consumers of livestock and livestock products.

There is no work yet been done on the evaluation of existing livestock feed acts in Bangladesh. If these policies are implemented fully then quality and safe animal food must be produced which is crying need at this moment. In addition to this, it will increase production level of milk, meat and eggs at private and Govt. level and have positive impact on human health that are suffering from malnutrition and diseases and the door of export of animal product would be opened up to earn foreign currency. If the acts are not implemented at all, human health would be in great risk. The way people are affected from the diseases of kidney, liver, heart and enteric disorders by the adulteration of food is a headache of the state which would be increased further. If the acts and policies are implemented partially people would be remained in between safe and unsafe situation as well as production would be decreased and opportunity of export would be threatened.

With above facts and circumstances to gain new explanatory insight a holistic survey analysis was carried out having different stakeholders on existing three livestock feed act with the following objectives:

(i) Critical analysis of the existing feed act in Bangladesh.
(ii) To investigate the status of animal feed act with different stakeholders.
(iii) To identify the gaps between existing act and expectations from the perspective of stakeholders on the implementation of act.
(iv) To recommend the output of the study to the concerned policy makers of the Government of Bangladesh.

Methodology

Selection of the study area

The study was carried out in seven divisions namely Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, Barisal and Rangpur. The selection of these divisions was done purposively by the researcher through consultation with the supervisory team. These seven divisions were chosen as these locations are contributing significantly in livestock and poultry sector of Bangladesh.

Selection of sample and sampling technique

Table 1 shows the sampling technique of the study. Total 237 representative samples (covering all stakeholders) were interviewed from selected seven divisions. A total of 377 respondents were interviewed consisting 116 farmers, 70 dealers and distributors, 39 Govt. official of livestock sector and 12 feed mill owners. In addition, three FGDs (Focus Group Discussions) at BAU, DLS, BLRI and 50 Key Informant Interviews (KII) were administered with different stakeholders.

Table 1. Population, Sample Size and Sampling Techniques

Objectives	Data Source	Divisions	Population	Sample
One	Secondary sources: desk review, BBS, DLS, BER, Scientific articles, Internet, Compendium, SWOT analyses	-	-	Animal Feed act
Two	FGDs (Three), KIIs (50), Questionnaire survey	Seven divisions	Livestock & poultry producers, input companies, DLS personnel, academicians, researchers & consumers	10-12 persons in each FGD, 50 KIIs
Three	Questionnaire survey, KII, FGD	Seven divisions	Livestock & poultry producers, input companies, meat processors, DLS personnel, academicians, researchers & consumers	237
Four	Previous sources	-	-	-

Selection of policy and acts

Feed act was chosen for critical analysis from the existing acts. To investigate the different factors of the existing feed act secondary data was collected. The SWOT analysis was performed for this act.

SWOT analysis

A SWOT analysis, desk-research and focus group discussion was carried out to critically analyze the existing animal feed act. This tool was used for policy-review approach aiming at Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the existing livestock-related feed act. SWOT is a strategic analysis technique widely used for getting an overview of the situation of any policy or organization (Pearce *et al.* 2012).

Preparation of survey instruments and pre-testing

To collect the required data, seven types of questionnaires were prepared in accordance with the objectives set for the study. The questionnaires were checked by the supervisory team. Questionnaires then pre-tested in the field among some stakeholders before final data collection. After pre-testing, the final questionnaires were prepared after making necessary corrections, modifications and adjustment in the light of the experience gained from the field.

Data collection and processing

The research relies on both primary and secondary data. Secondary information were sought from various publications, DLS reports, previous survey reports, compendium and the strategic plan documents of the Ministry of Livestock and Fisheries and livestock and poultry census report of BBS. Data were collected by the trained enumerator including the researcher himself through face to face interview.

Data analyses

Descriptive statistics like percentage, mean, ranks, bar and pie chart were used for different variables to describe the present status of different stakeholders regarding different feed act. Binary logistic regression was used to identify the variables influencing the feeding act. Most of these analyses were conducted by using the statistical package named SPSS 20 (IBM, 2011).

Results

Study on critical analyses of animal feed act, 2010

Critical analyses of existing animal feed act, 2010 was performed through SWOT analysis. This act was enacted on 28th January 2010. There were 24 sections in this feed act. The strength, weakness, opportunities and threats of the animal feed act is given in Table 2.

Table 2. Results of SWOT analysis of the animal feed act, 2010

SL. No.	Strength	Weakness	Opportunities	Threats
1	Animal feed control authority is well defined in section 3 (1-2).	Implementing authority is not well informed.	Verification of authority.	Non-cooperation from different stakeholders.
2	Without license animal feed production and processing are prohibited prescribed in section 4.	Animal feed industry peoples may produce, market and sale without license.	Proportion of license holders can be identified.	Threats from industry people, humiliation, physical assaults.
3	Licensing authority is well defined in section 5.	Fraudulence and fake license might be practiced	To examine whether fraudulence is being practiced or not.	Criminal intimidation to cause death or grievous hurt.
4	License giving procedure is well defined in section 6 (1-4) and renewal cited in section 7 (1-4). License fee and renewal in section 8.	Might have procedural defect.	To find out the defect of license giving procedure.	Pressure may create unlawfully to license giving authority.
5	License canceling and stay order shown in section 9 (1-3).	Lack of commitment, honesty and sincerity.	To identify culprits.	Possibility of being assaulted.
6.	Feeding standard and quality of feed ingredients displayed in section 10 (1-2).	Adulterated, polluted, fungal and expiry dated feed may be used.	To check the uses of feeding standard and measures the quality of feed ingredients.	Non-operation, no entrance for verification.
7.	Ensuring the quality of feed narrated in section 11 (1-3).	Low quality imported feed ingredients might have.	To ensuring the quality from imported or local ingredients.	Resistance to confiscate the imported low quality feed.

SL. No.	Strength	Weakness	Opportunities	Threats
8.	Banning of harmful and adulterated feed production, importing, exporting, selling, transporting and marketing as stipulated in section 12 (1-3).	Illegal, radioactive, poisonous, irrelevant of standardized feed.	To find out irrelevance of standardize feed, radioactive free feed.	Non-cooperation of port authority and others.
9.	Packaging and labeling of animal feed defined in section 13 (1-8).	Expiry dated animal feed, deterioration of nutrient content, fraudulence.	To find out animal feed kept on quality condition or not.	Non-cooperation and threats from dealers, and distributors and feed mill owner.
10.	Antibiotic, growth hormone, steroids, insecticide using in animal feed prohibited in section 14 (1-2).	Can hide the real information on production and processing places.	To verify whether they are using prohibited chemicals in feed or not.	Hide the actual fact, lack of lab. facilities to examine.
11.	Access to feed industry and other places by DLS authority shown in section 15.	Can hide information on feed products, places of processing, storage and selling centre.	To inspect the places of storage, processing, transport and document related to quality.	to resist the inspection by miscreants and ruling party musclemen.
12.	Confiscation and destruction of harmful and adulterated animal feed stipulated in section 16 (1-3).	Unhealthy, polluted, rotten, adulterated feed can have negative effect on public health and environment.	To confiscate questionable used materials and equipment and destroy harmful and adulterated feed.	Would create pressure from industry not to confiscate and destroy rotten and polluted feed.
13.	Commission of offense by feed company mentioned in section 17.	Opportunity to repeat the offense.	To find out the culprit in relation to animal feed industry.	Offender might be crazy.
14.	Prosecution and cognizance for trial and delivery of justice stated in section 18 (1-2).	Non-judicial mined justice may be delivered.	Justice hurried, justice buried. Corrupt judicial system may be changed. Judicial magistracy power may be applied in place of existing executive magistrate.	BCS admin cadre can start movement.
15.	Cognizable and bail able offense described in section 19.	Criminal may encourage to commit crime repeatedly after being out on bail.	To table the bill of offense with making cognizable and non-bail able in parliament.	Dishonest traders may resist tin passing the bill at parliament.
16.	Mention about sentence in section 20.	Minimum sentence and fine may encourage the crime related to animal feed.	Death sentence or imprisonment for life may be included in the panel code.	Unscrupulous traders may protest the sentence for death and imprisonment for life.
17.	Special power of Magistrate in imposing fine stated in section 21	Non-judicial discretionary power may be practiced and harassed traders.	To examine the discretionary power in application of any sentence by executive Magistrate whether judicially applied or not.	Executive Magistrate can go to movement.
18.	Power of formulation of provision shown in section 22.	Most of the parliament member being businessman is not able to understand for formulating this law.	Livestock expert may be elected as parliament member and minister.	Traders will not be agreed upon.
19.	Special provision in respect of functionary of ordinance mentioned in section 24 (1-2).	Criminal can escape after committing crime because of heaving opportunity in the law.	Lapse of necessary law can be found out, added, addition, substitution and amendment may be possible.	Interfere by opportunist in making provision.

Farmer's knowledge and perception about feed act

Table 3 shows the farmer knowledge and perception about feed fact. From the Table it shows that 56% farmers had used mash feed for poultry rearing. Fifty two per cent farmers responded positively that net weight is mentioned in packaged feed. It is compulsory that should have written in packaged feed. Fifty three per cent farmers do not check the expiry date of package feed. It is also must to be included in the bag in the eye of feed act. Fifty eight per cent farmers mentioned that the name of ingredients and percentage is not given on the bag. Sixty per cent farmers are not buying and producing locally available feed ingredients which are the violation of the existing feed act. Sixty one per cent farmers stated that prices of feed per bag fluctuated round the year. Sixty three per cent farmers do not know the feed act. Govt. is not taking proper step to create awareness about the feed act. Sixty five per cent farmers know the uses of tannery waste prohibited in feed. Thirty four per cent farmer's comment that they are highly experienced in using coccidiostat, antibiotic mixed feed and 75% farmers are buying ready feed with antibiotic and growth promoter. Sixty six per cent farmers are facing shortage of vaccine. From collected data out of 100% farmers show that 94% farmers facing problem of output price that is price being fluctuated.

Table 3. Farmer knowledge and perception about feed act

Particulars	Yes (%)	No (%)	Ranks
Mash feed found available or not	56	44	1
Net weight is given in packaged feed or not	52	48	2
Check the expiry date of package feed or not	47	53	3
Whether the name of ingredients and percentages are given or not	42	58	4
Buying and producing locally available feed ingredients for animal and birds feed	40	60	5
The prices of feed per bag is fluctuated or not	39	61	6
The feed act is known or not	37	63	7
The uses of tannery waste prohibited in feed is known or not	35	65	8
Facing problem of the shortage of vaccine and feed or not	34	66	9
Getting experience coccidiostat, antibiotic, probiotic mixed feed or not	34	66	9
Mash feed has been used in ready feed or not	34	66	9
The weight of per bag feed is fluctuated or not	31	69	10
Lot number is given to identify animal feed or not	30	70	11
Prefer pellet feed or not	28	72	12
Buying ready feed without antibiotic and growth promoter using or not	25	75	13

Knowledge about feed act by dealer and distributors

Knowledge about feed act by dealer and distributors is shown in Table 4. It is alarming that 70% dealers and distributors do not know the feed act. Thirty per cent dealers and distributors get introduced with feed act out of them only 12 % Govt. personnel play to familiarize the feed act among dealers and distributors. Field demonstration plays only by 1.4% and training by 5.7% for dissemination of feed act what is very alarming. The most (70%) of dealers and distributors are totally ignorant about feed act.

Table 4. Ways of familiarity of dealers and distributors with feed act

Particulars		Frequency	Per cent
Known	Attending training	4	5.7
	Mass media	7	10.0
	Govt. personnel	9	12.9
	Field demonstration	1	1.4
Total known		**21**	**30**
Unknown	Lack of awareness	3	4.3
	Lack of access to training	6	8.6
	Mass media	3	4.3
	Less contact govt. personnel	10	14.3
	Others	27	38.6
Total unknown		**49**	**70**
Total		**70**	**100.0**

Table 5 shows the Knowledge and perception of dealer and distributors related to feed act. More than 60% opined that dealer and distributors prefer to sell pellet feed than loose feed. More than 40% respondent negatively that prices of feed per bag fluctuated and registration no., air tight condition, permitted packet and container, identification code for source of ingredients inscribed on the package of feed. More than 50% mash feed is found always *ad libitum*. They are selling ready feed without probiotic, antibiotic and growth promoter. More than 60% respondent informed that lot number is not written to identify feed. Marketing of feed not allowed if the requirement which enshrined in the policy are not found practically on the bag of the feed. More than 70% respondent said mesh feed has not been used in ready feed because farmers want feed always ready to use.

More than 80% dealers and distributors replied that authorized officer did not visit farms and collect sample for quality testing. Inspector did not visit enterprise for destroying rotten, unhealthy, adulterated and polluted feed. They further stated that expiry dated feed is not sold out, but it has been sold little bit that is 12% and should come down to 0 levels considering the health hazards of present generation. Only 10% distributors told that tannery waste has been used in feed which is very alarming.

Table 5. Knowledge and perception of dealer and distributors related to feed act

Particulars	Yes (%)	No (%)	Rank
Prefer pellet feed or not	77	23	1
Net weight is given in packaged feed or not	73	27	2
Production date and expire date is mentioned in packaged feed or not	66	34	3
Whether the name of ingredients and percentages are given or not	60	40	4
The prices of feed per bag is fluctuated or not	54	46	5
Whether your feed packages have registration no., air tight condition, permitted packet and container, identification code for source of ingredients or not	53	47	6
Mash feed is found available or not	46	54	7
Buying and selling ready feed without probiotic, antibiotic and growth promoter	43	57	10
Lot number is given to identify animal feed or not	40	60	12
Marketing of feed are not allowed if above mentioned requirement are not found in the package is known or not	39	61	13
Is the weight of per bag feed fluctuated?	30	70	17
Whether the lot number is given for identifying the fisheries and livestock feed or not	30	70	18
Mash feed has been used in ready feed or not	29	71	19
The offence committed for violating feed act would be bail able and non-cognizable	23	77	21
Penalty Tk. 50,000 or 1 year imprisonment in jail sufficient for committing offence under this act or not	21	79	22
Any authorized officers visited and collected sample for quality testing	13	87	23
Any inspector visit your enterprise for destroying rotten, unhealthy, adulterated and polluted feed	13	87	24
Expiry dated feed is selling or not	12	88	25
Tannery waste as a source of protein concentrate being kept at your shop	10	90	26

Knowledge and perception of feed mill owner about feed act

It shows that 58% feed mill owner came to know about feed act through Govt. personnel. From the data it clearly shows that there is more need to be done to create the awareness about feed act to the feed mill owner.

Different variables on knowledge and perception of feed mill owner about feed Act is shown in Table 6. Hundred per cent feed mill owner stated that they know about importing pork meat and bone meal restricted, percentage of ingredients which written in bag, tannery waste product should not be used as protein source, adulterated/rotten food being destroyed, animal feed controlling authority, without license animal feed processing marketing totally banned, the law which has restricted not to be adulterated poultry feed, the law regarding poultry feed enacted by the government. About 92% feed mill owner do have knowledge about banning harmful or adulterated feed. Ninety per cent feed mill owners know that lot number given in a bag ensured to identify the feed. Eighty three per cent feed mill owners know that radioactive free animal feed must be certified during import and attached to supplying document is compulsory. Eighty three per cent feed miller have knowledge about quality feed which are to be ensured to the poultry in the eye of policy but in true sense they are not producing quality feed which is emerging issues for human health.

Seventy five per cent farmers responded that production date, expire date and net weight are mentioned in packaged feed. Forty two per cent millers stated TSE free bone meal are being imported from abroad by authorized veterinarian from concern country. Fifty eight per cent millers narrated that insecticides are using in feed. Fifty per cent millers said that meat and bone meal are imported from unidentified sources of animal; the license will be cancelled and ceased if found unacceptable or harmful ingredients in the feed and govt. can take any step for resolution of appeal. Fifty eight per cent millers responded negatively that the government is not encouraging importing soybean and establishing soybean mill for using soy meal as animal feed. Fifty eight per cent millers also negatively responded. DLS is not taking any necessary step to preserve quality poultry feed and feed ingredients. Same per cent millers stated that offence committed under this act should not be bailable or noncognizable, penalty Tk. 50,000 or 1 year imprisonment in jail is not sufficient for committing offence under this act. Thirty three per cent millers said that expiry dated feed selling unhindered. It is discouraging that 75% millers do not explore to use the unconventional feed ingredients are not being used for feed formulation. Fluctuation of feed weight occurred in bag commented by 40% feed miller. livestock authority are not giving written consent to any aggrieved person for filing suit before learned court and feed miller does not follow feed act.

Table 6. Knowledge and perception of feed mill owner about Feed Act

Particulars	Yes (%)	No (%)	Rank
Know about pork meat and bone meals importing is restricted	100	0	1
Per centage of ingredients which written in bag at ready for sale is accurate or not	100	0	1
Knowledge about tannery waste product should not be used as protein source	100	0	1
Adulterated/rotten food is being destroyed	100	0	1
Knowledge on animal feed controlling authority	100	0	1
Knowledge on animal feed licensing authority	100	0	1
Knowledge on without license animal feed processing, marketing is totally banned	100	0	1
Following the law which has restricted not to be adulterated poultry feed	100	0	1
Following the law regarding poultry feed enacted by the government	100	0	1
Known to harmful or adulterated feed is banned	92	8	2
Lot number is given to identify animal feed	90	10	3
Radioactive free animal feed must be certified during import and attached to supplying document is compulsory	83	17	4
Knowledge on ensuring quality feed is a must	83	17	4
Harmful and adulterated feed producing marketing and processing totally band is known	83	17	4
Knowledge to follow animal feed standard is mandatory	83	17	4
Antibiotic, growth hormone and coccidiostat is banned for using in feed	75	25	5
Whether mesh feed is available at your hand or not	75	25	5
Production date and expiry date is mentioned in packaged feed	75	25	5
Net weight is given in packaged feed or not	75	25	5
TSE free certified meat and bone meal is imported from exported country's veterinary authority	58	42	6
Insecticide is being used in feed	58	42	6
Meat and bone meal is imported from unidentified sources of animal	50	50	7
The license is cancelled and ceased if found unacceptable or harmful ingredients in the feed known to it	50	50	7
In case of canceling license or postponement Govt. is taking any step for resolution of appeal	50	50	7
Government encourages importing soybean and establishing soybean mill for using soya meal as animal feed	42	58	8
Knowledge on feed act yet to be implemented	42	58	8
Govt. or Govt. designated directorate/organization is taking necessary step to preserve quality feed and feed ingredients	42	58	8
Offence committed under this act should be bailable or non-cognizable or not	42	58	8
Penalty Tk. 50,000 or 1 year imprisonment in jail sufficient for punishment in committing offence under this act	42	58	8
Expiry dated feed is selling at you	33	67	9
Using unconventional feed ingredients that are locally available in feed	25	75	10
Weight of per bag feed is fluctuated or not	8	92	11

Knowledge and perception of ULO and DLO about different components of feed act

Table 7 shows knowledge and perception of ULO and DLO about different components of feed act. More than 90% livestock officials informed of the feed act, veterinary practitioner act to this extend that they are giving feed formula, housing management suggestions to the farmer. More than 70% officials suggest that they are working for maintaining standard of chick feed, follow international standard in case of using antibiotic, maintain withdrawal period of drugs in your prescription and followed the feed act.

Table 7. Knowledge and perception of ULO and DLO about feed act

Particulars	Yes (%)	No (%)	Rank
Give feed formula, housing management suggestions to the farmer	100	0	29
Knowledge about the veterinary practitioner act	95	5	26
Knowledge about the feed act	90	10	23
Registered veterinary surgeon or not	80	20	15
Working for maintaining standard of chick feed	79	21	14
Follow international standard in case of using vitamins, minerals, enzymes and antibiotic	77	23	13
Maintain withdrawal period of drugs in your prescription	74	26	9
Follow the feed act	72	28	8

Binary logistic regression for farmers' knowledge about feed act

Table 8 shows binary logistic regression for farmers' knowledge about feed act. Here knowledge about feed act is considered as binary (dependent variable) and others as endogenous variable. The Table reveals that, none of these endogenous variables have significant effect on the knowledge of farmers about feed act except education as $p< 0.05$.

Table 8. Binary logistic regression for farmers' knowledge about feed act

Variables	B	S.E.	Wald	P value	Exp(B)
Age	0.002	0.018	0.010	0.919	1.002
Education	0.086	0.041	4.431	0.035	1.090
Fam size	-0.019	0.143	0.018	0.895	0.981
Yearly Income	0.000	0.000	0.763	0.382	1.000
Farming Experience	0.027	0.031	0.736	0.391	1.027
Constant	-1.828	1.261	2.103	0.147	0.161

* $p < 0.05$ = Significant

Discussion

Outcome of the SWOT analyses of animal feed act 2010

Animal feed control authority is not functioning properly at different stakeholder's level although it is well defined in the act. They are not that much accountable to the stakeholders and also not field oriented. They should be monitored by monitoring cell which can be consisted by academicians, researchers and policy level peoples. DLS should play an important role for coordination for implanting the act. It is hearsay alleged in the allegation made by feed industry people that someone from DLS frequently come at feed mill and go back having bribe. They do this to avoid harassment from the authority so that they can run their business smoothly. License giving authority and its function is cited in the act. Authority assigned people should check as to whether fake license holders running business or not. Quality of feed ingredients and feeding standard are displayed to thwart the adulteration which is not maintained at all from the perspective of making safe food.

Government is not banning of imported feed ingredients which are found to be harmful in terms of poisonous, radioactive and halal. Expired dated feed should be brought to book for avoiding deterioration of nutrient contents. Antibiotics, steroids, growth hormones and insecticides should be prohibited mentioned in the act but it is using at alarming rate. Access to feed industry and others places by DLS peoples are mentioned in the act to hide out the exact picture of feed industry to safe guard in preparation of quality food. Confiscation and destruction of harmful adulterated feed should be a continued program to prevent human health hazards. Since magistracy power is given in the act to discourage to commit crime for offenders so that adulteration could not be happened. It is yet to be practiced in evaluating animal feed. Magistracy power should be handed over to the livestock officer/nutritionists because they are technically sound in implementing the act than that of existing executive magistrate. Primarily it is sufficient to train up them in accordance with Criminal Procedure Code, Rules and Provisions. There is also need feed certification authority in Bangladesh. The people's government will also put in place an amicable legal environment enabling association members to practice and to offer consultancy a clear delegation of their roles.

Farmer's knowledge and perception about feed act

Adulterated feed contains low level CP, CF, Ca, P and essential amino acids, and vitamins and minerals. Most recent study by El-Sayed (2014) stated that animal feed sectors in developing countries, that is; over half of the feed producers do not carry out proximate analysis, 60% of producers do not receive quality control inspections, and less than half the samples analyzed matched the values recorded on the labels. As a result production of livestock and poultry reduced lower than the expected level. Another research conducted by Bangladesh Agricultural Research Council (BARC) in 2012 and 2013 stated about 48 per cent poultry feed contains tannery waste. It also detected antibiotics in eggs and chicken far beyond the acceptable limit.

The government must act immediately (Sharifuzzaman Sharif, General Secretary of the citizens' body Nagorik Samhati, The Daily Star 15 July 2014). From collected data out of 100% farmers show that 94% farmers facing problem of output price that is price being fluctuated.

Knowledge about feed act by dealer and distributors

Expected feeding requires accurate information on the nutritional value of feeds in order to develop appropriate feeding strategies for different animals at various growth stages (Babic and Peric, 2011). On the other hand to make mash feed required ingredients are to buy separately and mix. Message should send back to dealer and distributors from the people of our country that if it's using not stops down by enforcing law they will take the law in their hand.

Knowledge and perception of feed mill owner about feed act

Bangladesh is a feed deficit country. At present there are about 250 registered feed mills in our country (Uddin, 2014). These feed mills are not produced sufficient amounts of feed. Considering the existing growth rate of poultry, cattle and aquaculture, the estimated annual compound feed requirement would be 10.60 million MT in 2020-21. The approximate annual feed production of different commercial feed industry is 2 million MT compound feed annually in the country. Therefore, according to the estimation of their existing production capacity, it is revealed that compound feed production will meet only 26.11% of the total requirement in 2020-21 (Uddin, 2014).

In spite of being an important link in the livestock production chain, the animal feed industry is important to help ensure the safety of food for human consumption, and in order to achieve this, producers must adhere to good manufacturing practices in the procurement, handling, storage, processing and distribution of animal feed (FAO and WHO, 2008). The existence of the association is essential in protecting the interests of the animal feed industry within the country, and is also responsible in ensuring the quality and safety of compound feeds (FEFAC, 2013), which can be achieved by setting clear rules and good manufacturing guidelines that ensure self-regulation and improved government regulation throughout the supply chain (Louw *et al.,* 2013). Eighty three per cent feed miller have knowledge about quality feed which are to be ensured to the poultry in the eye of policy but in true sense they are not producing quality feed which is emerging issues for human health. Most recent study by El-Sayed (2014) on the Egyptian aquaculture feed industry revealed some of problems which characterize animal feed sectors in developing countries, that is; over half of the feed producers do not carry out proximate analysis, 60% of producers do not receive quality control inspections, and less than half the samples analyzed matched the values recorded on the labels.

Understanding of the value chain approach offers an opportunity for evaluating integrated intervention initiatives within the animal feeds sector. The value chain using makes this possible by recognizing that compound feeds only form a single component of the value chain, whilst improved animal productivity through feed improvement depends on the efficacy of the entire value chain (Ayele *et al.,* 2012). They are also well equipped with knowledge that 83% adulterated food production, processing and marketing has been totally banned in feed act. Almost all feed miller complaint that criminal are not brought under trail. They want those criminals who are preparing adulterated feed should be produced before learned court so that they get exemplary punishment and discourage to commit this sort of crimes further. Learned Court should apply judicial mind in giving judgments in such a way criminal cannot get rid of punishment. Seventy five per cent feed millers respond positively in mixing probiotic, antibiotic, growth promoter, coccodiostat in feed. The feed additives used in the commercial feeds @ 1-1.5% i. e. around 70,000 MT feed additives used in commercial feeds annually (Uddin, 2014). The major feed additives are: toxin binder, mold inhibitor, enzymes, synthetic amino acids and vitamins, feed premixes, vitamin-mineral premixes, trace minerals, organic acids, and probiotics, salmonella killer, antibiotic for therapeutic use through feeds (antibiotic as growth promoter is strictly prohibited to use in the feed according to Feed Act (2010). Most of the feed additives have been imported by the Health companies and feed millers. Major Feed ingredients that have been imported by the commercial feed millers are: Meat and Bone meal, di-calcium phosphate, mono-calcium phosphate, fish meal, protein concentrates, stream dried fish meal, soybean meal where around 50% is locally produced now (Uddin, 2014). Tannery wastes contain toxic heavy metal chromium which is hazardous to the recipient animals and subsequently, this chromium transferred to the human being after consumption of intoxicated meat, milk and eggs (Parvin *et al*., 2017). This heavy metal comes from chromium sulphate used during tanning operation of hides and skins in the tannery. Therefore, there should be a clear indication and execution in the livestock feed act about the feed miller who utilize tannery wastes in the feed industry as a protein source.

Outbreaks such as bovine spongiform encephalopathy (BSE), *Escherichia coli* and *Salmonella* have highlighted the importance of the animal feed industry in public health, and although some curative measures may simply be improving staff training in feed mills (FAO and WHO, 2008).

Knowledge and perception of ULO and DLO about different components of feed act

More than 90% livestock officials informed of the feed act, veterinary practitioner act to this extend that they are giving feed formula, housing management suggestions to the farmer.

Binary logistic regression for farmers' knowledge about feed act

Here knowledge about feed act is considered as binary (dependent variable) and others as endogenous variable. None of the endogenous variables have significant effect on the knowledge of farmers about feed act except education as $p< 0.05$.

Qualitative results on Focus Group Discussion (FGD)

Accountability of academicians, DLS, BLRI, private sectors, NGOs and field level livestock officials need to be ensured. Need to refine the existing feed act based on case studies by simulation.

Qualitative results on Key Informant Interview (KII)

We had collected opinions from different stakeholders like researchers, academicians, GOs and NGOs, local leaders, civil society and CAB personnel, mass media personnel, lawyers, and bankers and from different professionals through Key Informant Interview (KII). All the respondents said formulation and implementation of livestock feed act is encouraging for the production of safe milk, meat and eggs. They stress to implement public campaign for the awareness regarding policy and act.

Conclusions

The study reveals that feed certification authority should have action plan and monitoring cell in order to implement the animal feed act. Establishment of modern feed analysis laboratory with necessary expertise to find out the quality that questions the adulteration of feed. Feed act should be up dated time to time to address the field based needs.

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