

## Chapter I: Introduction

The increase in demand for poultry meat has given momentum to use of synthetic compounds in a feed. This high cost of such compounds increases the cost of poultry feed. In addition to this, recently, the safety practices have been questioned, and their use is becoming restricted in many parts of the world. Therefore, there is a great renewed interest in developing natural alternative supplements to maintain animal performance and well-being (Chattopadhyay, 2006).

Feed additives are generally used to improve appetite, enhance production and also act as anti-stress agents. Further, it increases the efficiency of feed utilization, growth and improved survivability in broilers (Narayanswami *et al.*, 2003). Herbal liver tonics supplemented in broiler diets could serve as an effective growth promoters, and help in better weight gain in broiler chicks (Ramappa and Devegowda, 1975). Full benefits of the nutrients present in the diets count not be achieved without addition of feed additives in the diets.

Antibiotics are used at sub therapeutic levels for promoting the growth and immunity of chicks. The possibility of developing resistant bacteria as well as other side effects, when antibiotics are used as growth promoters in farm animals, have led to ban on use of most antibiotics as growth promoters in many countries. Therefore, an intensive search for alternatives such as phytobiotics and feed additives has started in the last decade.

Liver, an important organ actively involved in many metabolic functions and is the frequent target for a number of toxicants (Meyer and Kulkarni, 2001). Hepatic

damage is generally coupled with alteration of a range of metabolic functions (Wolf, 1999). Liver disease is still a worldwide health problem. It is a consequence of imbalance in energy metabolism leading to altered fat metabolism, and hence the fatty infiltration in liver and other vital organs (Whitehead *et al.*, 1978).

Hepatoprotection by conventional or synthetic drugs used in the treatment of liver diseases are inadequate and sometimes can have serious side effects (Guntupalli *et al.*, 2006).

Feed intake, body weight, hatchability, mortality, carcass characteristics, and other important traits governing the prosperity of the industry (Sahin *et al.*, 2009). With poultry farming profits becoming marginal, because of the increasing price of feed ingredients, enhancing farm productivity by improving feed utilization has become a core issue (Meyer and Kulkarni, 2001). NRC recommendation are usually based on the needs of healthy birds under ideal condition, but birds in commercial systems are normally exposed to different kinds of stresses, diseases and also the combination of environmental condition (Maroufyan *et al.*, 2010). Good feed alone will not serve the purpose, but its better utilization is also essential.

In view of above, the present study was undertaken to meet the following objectives:

**Objectives:**

1. To investigate the gross responses (feed intake, weight gain, feed conversion ratio) of broiler chickens against herbal liver tonic with different doses (1ml/liter water, 1.5 ml/liter water and 2ml/liter water).
2. To assess the survivability and meat yield traits of broilers fed water with herbal liver tonic.

3. To determine the profitability of broiler fed supplemental water with herbal liver tonic

## **Chapter II: Materials and Methods**

### **2.1 Statement of the experiment**

The experiment was conducted under the internship program at UVH placement in Upazilla Livestock office, Lohagara, Chittagong to investigate the productivity of broiler chickens fed herbal growth promoter (Superliv). Biological trial was conducted at the Bondho Poultry Farm, Lohagara, Chaittagong during the period of February to March, 2018. The laboratory analyses were rendered in the different research laboratories (e.g, PRTC ) of CVASU, Khulshi, Chittagong.

### **2.2 Preparation of the house**

The shed was prepared by cleaning and washing properly. The chicks were raised in the floor by allotting chicks into 16 pens of equal size (3×3 sq.ft). The pen was made by wire net, bamboo and cartoon. One feeder and one drinker were placed in each pen of replicate cage. The individual feeder and each pen were marked properly by sticker (writing with cage no. and treatment), before allowing the chicks into the cages. Chicks were brooded with an electric bulb (60 W) set above the chicks attached of each pen by hanging condition. The floor space provided for each bird was 1 sq. ft in the cage. The doors, windows, wire net etc., of the houses were painted before starting the trial.

### **2.3 Layout of the experiment**

A total of 144 (Cobb 500) day-old broiler chicks of either sex were collected from the local hatchery on a pre-order basis to the run the experimental trial from d1 to 28

days. The chicks were weighed ( $46.33 \pm 0.01 \text{g/b}$ ) on receipt and then randomly assigned into four dietary treatments groups ( $D_1$ ,  $D_2$ ,  $D_3$ , and  $D_4$ ); each treatment was replicated 4 times with 9 birds per replicate in a completely randomized design. The layout of the experiment was shown below in Table 1.

**Table 1: Layout of the experiment**

Treatment	Number of birds per replication				No. of birds
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	
<b>D<sub>1</sub>(Control)</b>	9	9	9	9	36
<b>D<sub>2</sub>(1ml/liter)</b>	9	9	9	9	36
<b>D<sub>3</sub>(1.5ml/liter)</b>	9	9	9	9	36
<b>D<sub>4</sub>(2ml/liter)</b>	9	9	9	9	36
<b>Total</b>	36	36	36	36	Grand total= 144

#### 2.4. Collection of feed and test ingredients

The ready-made (crumble-pellet) broiler diet (Paragon Feed Company Ltd.) were procured from the local market of Lohagara, Chittagong. The name of test ingredient used for this experiment is Superliv herbal liver tonic (supplied by ACI animal health limited, Bangladesh), is collected from the similar market of Chittagong,

The composition of this herbal liver tonic is given below in Table 2.

**Table 2. Chemical composition of superliv liver tonic**

Ingredients	Amount
<b>Choline chloride</b>	0.1 g
<b>Sorbitol solution</b>	50 g
<b>Herbal extract q.s.</b>	1 liter

Broiler starter diet (crumble) was used to feed the broiler up to 16 days, after that grower (pellet) diet was used entire the trial period (from 17 to 28). The test ingredient liver tonic (Superliv) was provided to the birds through mixing water. The dose of Superliv per treatment was shown above in Table 1. However, prior to supply ready-made feeds to the birds, the physical and or sensorial characteristics of feeds were observed carefully during collection and just before supplying the feeds to the birds. The following criteria were observed are moisture < 12%, colour, particle size, texture, nature, flavor, odour or smell, taste: not bitter or dull taste, foreign particles: free (sand, soil, dust, weeds, iron, nail, stone etc.); foreign body: free from moulds, fungus, insects, pests etc.

## **2.5 Management**

The following management procedures were followed during the experimental period and the uniformity in the management practices was maintained.

### **2.5.1 Housing and brooding**

The collected 144 chicks were randomly distributed in the 16 pens of equal size which were cleaned and disinfected previously. Chicks were brooded with four hovers each hover containing 6 bulb were used in middle of the 4 pens. If required, extra bulb was provided to the individual pens. For the first two days, the birds were provided with a temperature of 33°C. The temperature then was gradually reduced by 1 or 2 °C every 1 or 2 days until the chicks were 19 days old at which point the temperature was maintained at 24° C for the rest of the trial period. Each pen was furnished with a

feeder and drinker. Feeders were cleaned before supplying diets, and drinkers were washed weekly to maintain hygienic conditions.

### **2.5.2 Floor space**

Bird was raised in floor of an open- sided house, by dividing 16 pens of equally sizes (3×3 Sq. ft). Each pen was labeled properly with different treatment groups before entering chicks into the cage. Wood shaving litter materials were spread on the surface of the floor. Then dry and clean newspaper was placed on the floor of each pens as bedding materials prior to allowing chicks in the room, and the paper was replaced with new one as or when it get too dirt during the whole brooding period. Each pen having size (3.0 ft. × 3.0 ft.) was allotted for 9 birds. Therefore, floor space for each bird was 1 sq. ft.

### **2.5.3 Feeder and drinker space**

Each pen was furnished with a feeder and one drinker. One feeder (60 cm × 8 cm × 5 cm) and one round drinker with a capacity of 2.5 liters were provided for each pen. The feeder and drinker were placed in such a way so that the birds were able to eat and drink conveniently.

### **2.5.4 Feeding and watering**

Feed and drinking water were supplied *ad-libitum* to the birds throughout the experimental period. Feed was supplied to the experimental birds daily once in the morning at 6A.M. and again in the afternoon at 6 PM, and fresh drinking water was supplied the birds three times a day *i.e.* at 6 AM., 2 PM, and 8 PM. Paper and pot drinkers with small plate were used to feeding and watering the chicks during the early stages soon after coming from the hatchery. Bird was fed starter broiler diet for

the first 16 days , and then grower diet in pellet form was used to feed the broilers entire trial period from the rest of the trial period (17 to 28 days). During brooding period, feeding was done by using one round feeder and drinker having a capacity of 1.5 liter. The feeders and drinker were fixed in such a way so that the birds could eat and drink conveniently. After brooding period, large liner feeder (3.5 ft. × 0.38 ft.) and large round drinker with a capacity of three liters were used for serving the purposes.

### 2.5.5 Lighting

The birds were exposed to a continuous lighting of 23 hours and a dark period of 1 hour in each 24 hours of photoperiod.

### 2.5.6 Immunization and medication

All the birds were vaccinated against Newcastle Disease (ND), Infectious Bursal Disease (IBD) as per schedule given in Table 3. After each vaccination, multivitamin (Rena-WS, Renata; 1g/ 5 liter of drinking water) was supplied along with vitamin-C to overcome the stress due to vaccination and cold shock. During the first day of the experiment the day old chicks are supplied with glucose (Glucose-D) @ 1gm/2 litre drinking water. Then superliv is used in selected doses.

Table 3: **Vaccination schedule**

Age of experimental birds (days)	Name and type of Vaccines	Live /killed	Company Name	Name of disease	Route
4 <sup>th</sup> day	Hipra IB+ND	Live	Hipra	Newcastle Disease	Eye drop
11 <sup>th</sup> day	CH 80	Live	Hipra	Infectious Bursal Disease	Drinking water



17 <sup>th</sup> day	CH 80	Live	Hipra	Infectious Bursal Disease	Drinking water
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### **2.5.7 Sanitization**

Proper hygiene and sanitation programs were maintained strictly during the whole experimental period. Footbath containing potassium permanganate (1% w/v) was kept at the entrance of the poultry shed and changed daily.

### **2.5.8 Data and sample collection**

Mortality of bird were recorded as it occurred, while body weight and feed intake were recorded weekly for the calculation of body weight gain, and feed conversion ratio (FCR) was corrected for mortality. Livability was calculated from mortality of birds per replicate cage.

## **2.6 Record keeping**

The following parameters were recorded throughout the experimental period.

### **2.6 .1 Body weight**

The live weight of day old chicks was recorded at the first day of the experiment and at the beginning of each week the birds of each replication of each treatment was weighted and recorded properly.

### **2.6.2 Feed intake**

Weekly feed intake was recorded by deducting the left over feeds from the total amount supplied to birds each week.

### **2.6.3 Mortality**

Mortality was recorded when death occurred.

### **2.6.4 Temperature and relative humidity of house**

During the experiment the temperature and relative humidity were recorded four times a day i.e. 6 A.M., 12 P.M., 6 P.M. and 12 A.M. The temperature and relative humidity was recorded with the help of hygrometer.

## **2.7 Calculation of data**

### **2.7.1 Weight gain**

The weight gain was calculated by deducting the initial body weight from the final weight.

### **2.7.2 Feed conversion ratio (FCR)**

The amount of feed consumed per unit of weight gain is called feed conversion ratio.

This was calculated by using the following formula:

$$\text{FCR} = \frac{\text{Feed intake (g)}}{\text{Body weight gain (g)}}$$

### **2.7.3 Mortality**

It was calculated on the basis of total number of birds housed and number of birds of died during the experimental period. The percentage of mortality was calculated by this following formula:

$$\text{Mortality (\%)} = \frac{\text{Number of birds died}}{\text{Total no. of birds housed}} \times 100$$

### **2.7.4 Dressing percentage**

The dressing percentage of birds was calculated by formula given bellow:

$$\text{Dressing (\%)} = \frac{\text{Dressed weight}}{\text{Body weight}} \times 100$$

### **2.7.5 Statistical analysis**

All recorded and calculated data were statistically analyzed for analysis of variance in a Completely Randomized Design (CRD) using the Minitab statistical computer package program (Minitab, 2000). The significance of differences between means was tested using the Duncan multiple-range test. Statistical significance was considered at  $P \leq 0.05$ .

Photographs of the experiment:



Fig.1 Brooding of chicks.



Fig.2 Weighing of birds



Fig.3 Grower birds.

## Chapter III: Results

The experiment was carried out to find out the effects of growth promoter (Superliv) on the gross responses (body weight, feed intake, FCR), carcass yield traits (dressing percentage, drumstick weight , thigh weight, breast weight, giblet weight, shank weight, neck weight , back weight), livability, and profitability of Cobb 500 broiler chickens. The results obtained from the study are stated below.

### 3.1 The gross responses and livability of broiler chickens on superliv

#### 3.1.1 Body weight

The results of cumulative body weight (BW) of broiler chickens are shown in Table 4. The data showed that BW of broilers differed significantly ( $P < 0.05$ ;  $P < 0.01$ ) between treatments entire the trial period, except for first week. Significantly highest BW (1661.90 g/b) was found in the birds fed D<sub>2</sub> diet whereas D<sub>1</sub> being the lowest BW (1302.20 g/b) from d1-28.

**Table 4: Cumulative body weight (BW) of broiler chickens treated with superliv from 1-28 days**

	Age (days)	Treatment				Pooled SEM	P- values
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>		
	1-7	159.89	198.97	197.83	173.08	6.410	0.13
<b>BW(g/b)</b>	1-14	395.00 <sup>c</sup>	524.72 <sup>a</sup>	469.56 <sup>b</sup>	426.14 <sup>c</sup>	9.855	0.01
	1-21	865.50 <sup>c</sup>	1114.40 <sup>a</sup>	910.60 <sup>b</sup>	898.00 <sup>b</sup>	28.300	0.05
	1-28	1302.20 <sup>c</sup>	1661.90 <sup>a</sup>	1497.40 <sup>a</sup>	1386.20 <sup>b</sup>	41.550	0.05

[Data represent mean values of nine birds per replicate groups during 1- 28 days; <sup>a,b,c</sup>Means bearing uncommon superscripts within a column are significantly different at the levels shown above; SEM= Pooled standard error of means].

### 3.1.2 Feed intake

The feed consumption of birds during different stages of growth in different dietary treatments is given below in Table 5. Results show that feed intake had no significant difference ( $P>0.05$ ) between the treatment groups from d1-28 days. Numerically, birds on D<sub>2</sub> group consumed more feed than that of other diet group on day 28d, though no difference ( $P>0.05$ ) was observed between treatments.. The feed intake (FI) of D<sub>2</sub> group is 2497.60g followed by 2434.10, 2415.90 g, and 2386.0g in D<sub>3</sub>, D<sub>1</sub> and D<sub>4</sub>, respectively, on the last day of trial period (28).

**Table 5: Feed intake (FI) of broiler chickens treated with superliv from 1-28 days**

	Age (days)	Treatment				Pooled SEM	P- values
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>		
	1-7	161.67	185.83	187.36	169.17	5.320	0.289
FI (g/b)	1-14	636.11	710.83	704.92	659.17	15.278	0.292
	1-21	1501.80	1720.80	1599.50	1594.90	34.000	0.211
	1-28	2415.90	2497.60	2434.10	2386.00	19.00	0.254

### 3.1.3 Feed conversion ratio (FCR)

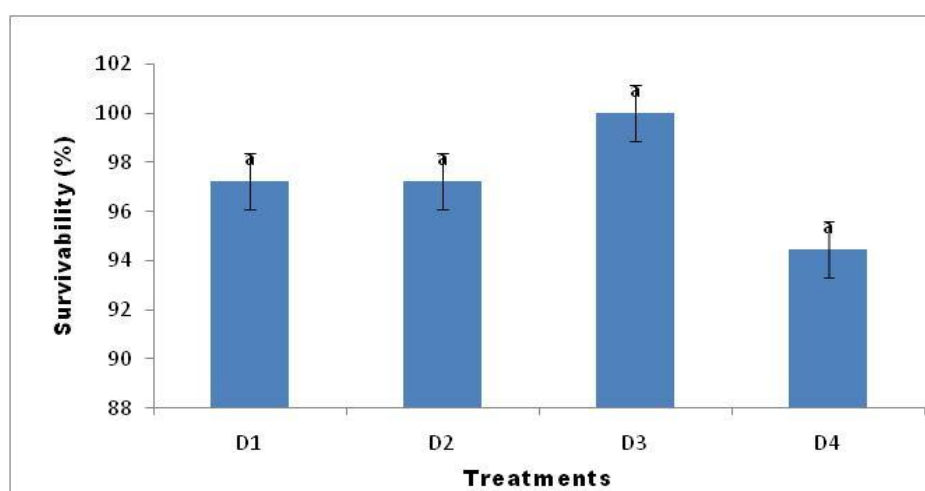
The efficiency of feed of broiler chicks in different dietary treatments recorded during different stages of growth is presented in Table 6. Data revealed that the FCR of broilers differed significantly ( $P<0.05$ ;  $P<0.01$ ) during 2<sup>nd</sup> and 3<sup>rd</sup> weeks only, except for 1st and last weeks. Poorly significant ( $P<0.08$ ) FCR values were found in the broilers fed liquid Superliv supplement during last and first weeks, respectively. Improved FCR value (1.61) was observed in the D<sub>2</sub> group of broilers compared to those of other groups.

**Table 6: Feed conversion ratio (FCR) of broiler chickens treated with superliv from d1-28 days**

	Age (days)	Treatments				Pooled SEM	P-values
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>		
FCR	1-7	1.42	1.24	1.24	1.34	0.0254	0.081
	1-14	1.82 <sup>a</sup>	1.48 <sup>c</sup>	1.66 <sup>b</sup>	1.74 <sup>a</sup>	0.005	0.01
	1-21	1.83 <sup>a</sup>	1.61 <sup>b</sup>	1.87 <sup>a</sup>	1.88 <sup>a</sup>	0.029	0.05
	1-28	1.98	1.55	1.68	1.79	0.054	0.084

### 3.1.4 Livability (%)

The data on livability are presented in Fig. 1. It is evident that one bird died in D<sub>1</sub> and D<sub>2</sub> groups resulting 97.22% livability, while two birds died in group D<sub>4</sub> resulting 94.44 % livability. Actually, no mortality is counted in the group of D<sub>3</sub>, which indicates 100% viability. In fact, the data of viability of broilers revealed that there is no significant difference ( $P>0.05$ ) between the treatments.



[Fig 1: Survivability of broiler chickens fed ready- made diets supplemented with growth promoter (superliv) from d1-d28; Bar with similar letter has no significant difference ( $P>0.05$ ) between treatments ]

## CHAPTER IV: DISCUSSIONS

### 4.1 Gross responses of broilers fed Superliv liquid supplement

#### 4.1.1 Body weight of broilers

It is obvious from the data that the body weight in Superliv liquid supplemented group was found to be significantly improved as compared to control group throughout the experiment. The main function of feed additives is to enhance feed utilization efficiently. Once after applied in the broilers, the feed additives start to act upon their digestibility of the ingested nutrient materials, which are then help the birds to utilize feed more efficiently. It can be assumed that, the efficient utilization of feed by the broilers might give rise to better growth responses of the broiler chickens. Our findings agreed with the results of previous investigators (Babu *et al*, 1992, Narahari, 1995, Prajapati, 1997, Samarsinghe *et al.*, 2002), who found significant improvements in body weight due to supplementation of other herbal feed additives in broilers. The body weight gain in Superliv liquid supplemented birds might be attributed to the growth promoting activity of its constituent herbs viz. *Andrographispaniculata*, *Azadirachtaindica*, *Phyllanthusniruri* (Jagadeeswaran and Selvasubramanian, 2014; Mathivanan *et al.*, 2006; Durrani *et al.*, 2008).

#### 4.1.2 Feed intake

There is no difference between feed consumption of broiler chickens fed herbal supplemented Superliv in our current study. It denotes that broilers consumed feed uniformly entire the trial period. The uniform feed intake of broilers on herbal growth promoter might be due to providing same diet and the mode of application of growth



promoter to the birds. Herbal growth promoter was applied to the birds via water, not with feed, as it is liquid in form. This mode of application of growth promoter might be a reason for similar feed intake of the broilers. Besides, all birds had a free access to same diet entire the trial period. It was observed that there were no adverse effects of the herbal liver tonic on feed consumption, palatability and thereby performance of broiler birds. These findings are in accordance with reports of Bhattacharyya *et al.* (2015), who noticed non-significant influence on feed intake with Superliv supplemented diets.

#### **4.1.3 FCR**

The data of FCR value indicates that birds of D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub> groups assumed to be more efficient in converting feed to meat than the broilers of D<sub>1</sub> group during the experimental period of 1-7days. It showed that the birds of D<sub>2</sub> group assume to be more efficient than that of others, as the broilers of this diet group (D<sub>2</sub>) had received superior FCR value (1.63) than that of other diet groups. The results of present study are in agreement with those reported by Hung *et al.* (1992). Use of herbal growth promoters improved feed conversion ratio and feed efficiency, because they have stomachic, appetitive, demulcent and tonic activity in addition to anabolic, adaptogenic, immune-stimulant and rejuvenative functions in the body (Narahari, 1995 and Prajapati, 1997). It showed that supplementation of Superliv @1ml/liter water, improved feed utilization of commercial broiler birds, which could be beneficial to the farmers.

#### **4.1.4 Survivability of broilers**

It is clear from the survivability data that herbal growth promoter had no influence on the livability or mortality of birds. It implies that herbal growth promoter does not have any detrimental impact on the viability of broilers. So, it can be applied to the birds without any doubt. Though numerically, the highest mortality was observed in treatment group D<sub>4</sub>, which is considered within the normal range.

The numerical increased mortality in D<sub>4</sub> group might be due to ascitis. The pathological changes observed under postmortem examination of dead bird did not attribute to the dietary treatments.

## **Chapter V: Conclusion and Recommendation**

An overview of the results obtained in this study revealed that, broiler chickens fed herbal growth-promoters supplementation responded positively as a result of increased body weight, improved different meat cuts, better FCR, and greater profit margin without affecting feed intake. So broiler fed on this supplemented herbal tonic could be reared profitably as the production cost incurs lower than the unsupplemented diets. From the results, it could be assumed that, application of supplemental products on the broilers chickens, might enhance broiler production and cut cost significantly. Supplementation of herbal growth promoter on broiler chicken might be economical, and it could enhance commercial production. Further, it might enhance nutrient availability of bird and thus increase the productivity of broiler chickens. Data on herbal products not adequate, and it might warrant further study to boost up the broiler production profitably. Broilers rearing on herbal products might change the consumer view and could draw the attention of the consumer world to ingest broiler meat produced from herbal tonic, because it has no health hazard or residual effect, as is seen in the antibiotics.

Body weight gain were significantly increased in the birds supplemented with Superliv liquid (herbal liver tonic supplement). Improved FCR was found in Superliv liquid supplemented birds. Superliv liquid supplementation gave better economic returns. On the basis of all the findings, it can be concluded that, supplementation of liver tonic product Superliv (supplied by ACI animal health limited, Bangladesh) is efficacious for improving growth performance and economic returns in broilers. It indicates that the property of hepato-protective and liver tonic could protect the liver

from any damage thereby did not cause any liver dystrophy or other vital organ abnormality where from these enzymes are secreted. The product was found to be safe for usage and can be recommended as liver tonic and growth enhancer in poultry.

In conclusion, Superliv @ 1ml/liter of water could act more effectively for compensating the negative impact of liver function of broiler, thereby improving the growth performance, nutrient utilization, carcass traits and economics of broiler production without any detrimental effect on health.

## Chapter VI: References

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**The Author**  
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## Biography



I am Sydus Shalekin Shakil, I completed my Secondary School Certificate (SSC) examination in 2009 with GPA-5 from Hazi Mohammad Mohsin Govt High School, Chittagong and Higher Secondary Certificate (HSC) examination in 2011 with GPA-5 from Chittagong Cantonment Public College, Chittagong. Currently, I have been doing my internship programme which is the compulsory of DVM programme under the Faculty of Veterinary and Animal Sciences University. My favorite hobby is reading books. I feel much interested in exploring new techniques for contributing in development of veterinary field in Bangladesh and beyond.