**CHAPTER-I**

**INTRODUCTION**

Livestock plays an important role in the national economy of Bangladesh with a direct contribution of around 3 percent to the agricultural GDP and providing 15 percent of total employment in the economy (BLRI, 2010). About 75% people rely on livestock to some extent for their livelihood, which clearly indicates that the poverty reduction potential of the livestock sub-sector is high.

Many animals receive maintenance or below maintenance levels of nutrition resulting in low levels of production. Increasing the quantity of feed by reducing the number of animals does not provide a solution as the nutritional value of the available feed is low. The addition of a small amount of higher quality feed can have a large effect on production in this situation. In the case of milk production, the use of cattle with a small body size would result in reduced maintenance requirements of the animal, thus enabling more efficient use of available feed for milk production (FAO, 1999).

Significant differences were also performed between pregnant, non-pregnant and lactating cows with glucose and calcium being the highest in the non-pregnant cows. In lactating cows globulin and cholesterol were the highest and albumin-to-globulin ratio was lowest. Pregnant cows showed the highest hematocrit and the lowest potassium in comparison to the other groups (Otto, 1992).

Physiological equilibrium is maintained mainly by the blood in the body (Geneser, 1986), but many physiological conditions may alter this equilibrium. When thorough history and physical examination fail to yield a diagnosis in difficult cases, many practitioners turn to blood samples for a complete blood count and chemistry panel, hoping these tests will identify the problem (Navarre, 2007).

The importance of hemato-biochemical indices in animal husbandry is well acknowledged. Metabolic disturbance usually by inappropriate feeding without manifestation of clinical symptoms are important in animal husbandry and may cause insufficiently developed breeding cattle (Radostits *et al.,* 2003).

Highly significant negative correlation was seen between age and glucose, potassium, and phosphorus. Highly significant positive correlation was seen between age, globulin and total proteins. Significant correlations were also seen between body weight/age ratio to glucose, total proteins and phosphorus (Bogin *et al.,* 1988).

Some significant differences were also seen in the blood levels of various analytes in comparison to cattle in other countries, which were a result of genetic, climatic, nutritional and environmental conditions (Otto *et al.,* 2010).

Hence, the biochemical values during different physiological situations should be known for the diagnosis of various pathological and metabolic disorders, which can adversely affect the productive & reproductive performance of cows, resulting in great economic losses to dairy farmers (Pyne and Maira, 1981).

Therefore the present study was performed with the following objectives.

**OBJECTIVES**

1. To determine the biochemical analysis of blood in pregnant and non pregnant cattle.
2. To compare the biochemical blood parameters of pregnant and non pregnant cattle.
3. To know about the normal level of different blood parameters in pregnant and non pregnant cattle.

**CHAPTER-II**

**REVIEW OF LITERATURES**

**2.1. Serum Biochemistry**

The majority of biochemical parameters differ from pregnant to non pregnant cattle (Otto *et al.* 2010).

**2.1.1. Total Protein**

Physical examination and or globulins and fibrinogen are needed to determine the exact cause. Hypoproteinemia most often is caused by lack of adequate protein in the diet or protein loss. Liver disease usually does not result in a low protein in ruminants. Nutrition problems and chronic parasitism should be ruled out first. These animals might be anemic also. If these are ruled out, loss from the gastrointestinal tract, urinary tract or into the peritoneal or pleural cavities should be suspected. Serum protein, constitute a portion of the amino acid pool of the body and as such are believed to be indicative of the nutritional status of the animal (Navarre, 2007).

About 50% of cattle in the hot-wet season had total protein (TP) concentrations below the normal range whilst 77% in the post-rainy season had concentrations above the normal range. Total protein concentrations were lowest in the hot-wet season and highest in the post-rainy season in the sweet rangeland. Pregnant non lactating cows had highest TP concentrations compared to other cows. Breed, sex, age and parity had no effect on total protein concentration (Mapiye *et al.*, 2010).

In dairy cattle total protein levels were reported to be higher in dry cows, while albumin concentration were lower in lactating non pregnant as compared to lactating pregnant animals (Peterson *et al*., 1981).

In cross breed cows hemato-biochemical parameters at early (up to three month), mid (up to six month) and late (up to nine month) pregnancy was total Protein (gm/dl)6.92 ± 0.33, 8.05 ± 1.17, 7.49 ± 0.22 respectively (Manzoor *et al.,* 2008).

**2.1.2. Glucose**

Glucose level is not same in pregnant and non pregnant cattle. Glucose level is higher in the non-pregnant cows than pregnant cows (Otto *et al.,* 2010).

In cross breed cows hemato-biochemical parameters at early (up to three month), mid (up to six month) and late (up to nine month) pregnancy was glucose (mg/dl) 54.06 ± 1.60, 48.87 ±3 .65, 48.21 ± 2.08 respectively (Manzoor *et al.,* 2008).

Reference values of means and standard deviations (SD) of blood serum components at 4-5 years old and 6-10 years old shorthorn cows wasglucose (mg/dl) 3.7 ± 0.7, 3.7 ± 0.6 respectively(Doornenbal *et al*., 1988).

**2.1.3. Calcium**

The average values of serum Ca of cows in peripartal period was 10.9 ± 0.71mg/dl in 5-6 days, 9.6 ± 0.46 mg/dl in 20-21 days and 9.9 ± 0.48 mg/dl in 40-41 days. Concentration of serum calcium decreased at 20-21 days postpartum and increased insignificant in the end of monitoring period. This evolution was a result of calcium passing in mammary gland, using it for milk synthesis, and consumption in other tissues (Onita and Colibar, 2009).

Bovine biochemistry reference intervals at 2 wks to 6 month calcium (mmol/lit) 2.35-2.74, but at 2 yrs calcium (mmol/lit) 2.10-2.67 (Lumsden *et al.*, 1980).

Dairy cattle with high milk production and being fed large quantities of grain, where exercise is limited may have abomasal atony. Other contributing factors decreased abomasal motility include metabolic disorders (hypocalcemia and ketosis), concurrent diseases as mastitis and metritis, changes of intra-abdominal organs especially in late pregnancy and genetic predisposition (Robertonson, 1968; Delgado-Lecaroz *et al*., 2000 and Radostits *et al*., 2000).

**2.1.4. Albumin and Globulin**

Nearly 70 and 85% of cattle in the hot-dry and hot-wet seasons, respectively had albumin concentrations below the normal range. Nguni cattle had lower albumin concentrations than local crossbreds (25.4±0.34 (gm/l )versus 27.7±0.24 (gm/l) ). Nguni and crossbred cattle in the sweet rangeland had higher albumin concentrations (29.9±0.97 gm/L) than those in the sour rangeland (27.4±0.96 gm/L).

Albumin concentrations of both breeds were lowest in the hot-wet season. Heifers had the highest albumin concentrations compared to cows in other parities. Albumin concentration was highest in pregnant non-lactating cows compared to other cows. Age and sex had no effect on albumin concentration (Mapiye *et al.*, 2010).

Most of the cattle in the hot-dry (64%), post-rainy (93%) and early cool-dry season (76%) had globulin concentrations above the reference range. Crossbred cattle on sour rangelands had the highest globulin concentrations (42.5±5.43 gm/L) followed by Nguni cattle on sour rangeland (38.6±5.24 gm/L), local crossbreds on sweet rangeland (36.5±3.31 gm/L) and Nguni cattle on sweet rangeland (34.4±2.44 gm/L). Globulin concentrations were lowest in the hot-wet season and highest in the post rainy season. Serum globulin concentrations increased from parity 0 to 6. Sex, age and physiological status of cow had no effect on globulin concentrations (Marufu *et al.*, 2009).

**2.1.5. Phosphorus**

The average values of serum phosphorus of cows in peripartal period was 6.7 ± 0.32 (mg/dl) in 5-6 days, 5.2 ± 0.18 (mg/dl) in 20-21 days and 5.7 ± 0.21 (mg/dl) in 40-41 days (Onita and Colibar, 2009).

Inorganic Phosphorus and calcium both generally decreased with increasing age beyond one year of age. One of the main functions of these elements is there involvement in skeletal growth in young animals. In older animal there is a decreased need for calcium (Ca) and inorganic phosphorus (iP) for this purpose and this is reflected in lower blood levels (Doornenbal *et al*., 1983).

**CHAPTER-III**

**MATERIALS AND METHODS**

**3.1. Study Period**

This study was conducted for a period of 60 days (January and February, 2012.) in Molla Dairy Farm, Paharika Dairy Farm and Jorif Dairy Farm, Chittagong.

**3.2. Selection of Farm**

Chittagong area is potential for dairy farm because of its high demand of fluid milk, suitable weather, feeds and fodder availability, veterinary facilities from Chittagong Veterinary And Animal Sciences University. So there is good communication with university and dairy farms as for giving various technical supports to the farms and for some research work also. Molla, Paharika, Jorif Dairy Farms were selected for conducting the study because of its suitable location, large population, satisfactory record keeping system, proper feeding and management and also for their kind cooperation.

**3.3. Study population**

Study population was 100 cross bred multiparous (HF X Local, Shahiwal X Local, HF x Shahiwal X Local.) 50 pregnant and 50 non pregnant cows. Cows were in different age and production status.

**3.4. Farm Management:**

**3.4.1. General Management System of Molla Dairy Farm**

1. **Housing System**

The pattern of housing is face -in system. There is different shed for different status of animal e.g. milch cow shed, heifer shed, dry cow shed, pregnant cow shed and calf shed. In every shed there is individual cow distance, common allay, gutter etc. The floor is made of concrete. Surface of the floor is even and generally no bedding material is used. There is proper drainage facility and quick disposal of animal waste. Farm workers wash the floor three times daily and bath the cows once daily. There is both natural and artificial air flow and available light in every shed.

1. **Health status of animal**

All animals involved in this study were clinically healthy and for ensure this clinical history was reviewed with the farm manager with the examination of physical condition.

1. **Feeding System**
* **Roughage:**

There are separate mangers for each of the cattle. Both roughage and concentrates are offered to them. The farmer grows Para grass besides the farm area and have own cattle feed mil. Available green fodder is supplied from own fodder land and Concentrate from available feed mill. Straw is also bought from others.

* **Concentrate**

Rice polish, Wheat bran , Broken maize, til oil cake, coconut oil cake, Pulse husk, Molasses, salt,Toxin binder etc.The feeding schedule-Concentrate and straw is supplied at 8.30 am, green fodder at 11.30 pm again concentrate at 6.30 pm and straw at 7.30pm.

**D. Pregnant cow management**

The pregnant cows are kept in separate sheds. They take extra care to them. They supply drinking water from underground pure water source. They provide more protein containing feed to them.

**E. Production Management**

The farm produces about 310 liters in the morning and about 125 liters at afternoon. The average daily yield of the farm is about 320 liters. The farmer practice hand milking. Before milking milker’s hands and teat dipping is practiced buy potassium per manganate PPM (0.1%).

**F. Breeding management**

Most of the milkers detect heat of their cows during milking in the morning and AI usually done within 10-14 hrs by AI technician. Usually AI is done 2 times per conception for each of the cows. Sometimes natural service is practiced by the farmers. Mostly they use HF semen. Generally they keep AI sheet as a breeding record which is provided by AI technician. AI technician or Veterinarian diagnose the pregnancy by rectal palpation.

**G. Health Therapeutics and Preventive Management**

There is a least prevalence of infectious diseases in the farm. When any symptom of sickness arises the farmer calls a veterinarian. Anthelmentic treatment and vaccination is regularly practiced in this farm.

**Table: 1 Vaccination program that follow in Molla Dairy Farm**

|  |  |  |
| --- | --- | --- |
| **Name of the vaccine** | **Frequency of use** | **Groups of animals administered** |
| FMD Vaccine | thrice/year | All animals except pregnant |
| BQ Vaccine | Twice/year | All animals except pregnant |
| Anthrax vaccine | once /year | All animals except pregnant |

**Table : 2 Anthelmentic Treatment followed in Molla Dairy Farm**

|  |  |  |
| --- | --- | --- |
| **Name of Anthelmentics** | **Frequency of use** | **Dosage** |
| Pera vet® powder (piperazine citrate) | Single dose at young stage | 5-10gm/30kg body wt. |
| Triolev vet® (Levamisole +Trichlabendazole) | Every 3 months alternate | 1 bolus /75kg body wt. |
| Endex®(Levamisole +Trichlabendazole) | Every 3 months alternate | 1 bolus /75kg body wt. |

**3.4.2. General Management System of Paharika Dairy Farm**

**A. Housing System**

The pattern of housing is face -in system. There is different shed for different status of animal eg. milch cow shed, heifer shed, dry cow shed, pregnant cow shed and calf shed. In every shed there is individual cow distance, common allay, gutter etc. The floor is made of concrete. Surface of the floor is even and generally no bedding material is used. There is proper drainage facility and quick disposal of animal waste. Farm workers wash the floor four times daily and bath the cows once daily. There is both natural and artificial air flow and available light in every shed.

**B. Health status of animal**

All animals involved in this study were clinically healthy and for ensure this clinical history was reviewed with the farm manager with the examination of physical condition.

**C. Feeding System**

* **Roughage**

Roughage is offered to them. The farmer grows German grass besides the farm area. Available green fodder is supplied from own fodder land.

* **Concentrate**

Rice polish,Wheat bran , Broken maize,Broken rice, coconut oil cake, Molasses, salt,Toxin binder etc.are use as concentrate. The feeding schedule-Concentrate and straw is supplied at 10am, green fodder at 12am again concentrate at 5.30 pm and straw at 7.00 pm.

**D. Pregnant cow management**

The pregnant cows are kept in separate sheds. They take extra care to them. They supply drinking water from underground pure water source. They provide more protein containing feed to them.

**E. Production Management**

The farm produces about 300 liters in the morning and about 105 liters at afternoon. The average daily yield of the farm is about 420 liters. The farmer practice hand milking. Before milking milker’s hands and teat dipping is practiced buy potassium per manganate PPM (0.1%).

**F. Breeding management**

Most of the milkers detect heat of their cows during milking in the morning and AI usually done within 10-14hrs by AI technician. Usually AI is done 2 times per conception for each of the cows. Sometimes natural service is practiced by the farmers. Mostly they use HF semen. Generally they keep AI sheet as a breeding record which is provided by AI technician. AI technician or Veterinarian diagnoses the pregnancy by rectal palpation.

**G. Health Therapeutics and Preventive Management**

There is a least prevalence of infectious diseases in the farm. When any symptom of sickness arises the farmer calls a veterinarian. Anthelmentic treatment and vaccination is regularly practiced by the farm owner.

**Table: 3 Vaccination program that follow in Paharika Dairy Farm**

|  |  |  |
| --- | --- | --- |
| **Name of the vaccine** | **Frequency of use** | **Groups of animals administered** |
| FMD Vaccine | thrice/year | All animals |
| Anthrax vaccine | once /year | All animals |
| HS vaccine | 0nce/year | All animals |
| BQ vaccine | Twice/year | All animals |

**Table : 4 Anthelmentic Treatment followed in Paharika Dairy Farm**

|  |  |  |
| --- | --- | --- |
| **Name of Anthelmentics** | **Frequency of use** | **Dosage** |
| Antiworm bolus® (Levamisole +Trichlabendazole) | Every 3months alternate | 1 bolus /50kg body wt |
| LT-vet®(Levamisole +Trichlabendazole) | Every 3months alternate | 1 bolus /50kg body wt |

**3.4.3. General Management System of Jorif Dairy Farm**

**A. Housing System**

The pattern of housing is face -in system. There is different shed for different status of animal eg. heifer shed, dry cow shed, pregnant cow shed, calf shed. In every shed there is individual cow distance, common allay, gutter etc. The floor is made of concrete. Surface of the floor is even and generally sometimes bedding material is used. There is proper drainage facility and quick disposal of animal waste. Farm workers wash the floor three times daily and bath the cows once daily.

**B. Health status of animal**

All animals involved in this study were clinically healthy and for ensure this clinical history was reviewed with the farm manager with the examination of physical condition.

**C. Feeding System**

* **Roughage**

There are separate mangers for each of the cattle. Roughage is offered to them. The farmer grows Napier grass besides the farm area. Available green fodder is supplied from own fodder land.

* **Concentrate**

Rice polish,Wheat bran , Broken maize,Broken rice ,Til oil cake, Mustard oil cake, Molasses, salt, etc.are use as concentrate.The feeding schedule-Concentrate and straw is supplied at 10 am, green fodder at 12 am again concentrate at 6.30 pm and straw at 7.30 pm.

**D. Pregnant cow management**

The pregnant cows are kept in separate sheds. They take extra care to them. They supply drinking water from underground pure water source. They provide more protein containing feed to them.

**E. Production Management**

The farm produces about 310 liters in the morning and about 115 liters at afternoon. The average daily yield of the farm is about 440 liters. The farmer practice hand milking. Before milking milker’s hands and teat dipping is practiced buy potassium per manganate PPM (0.1%).

**F. Breeding management**

Most of the milkers detect heat of their cows during milking in the morning & AI usually done within 10-14hrs by AI technician. Usually AI is done 2 times per conception for each of the cows . Sometimes natural service is practiced by the farmers. Mostly they use HF semen. Generally they keep AI sheet as a breeding record which is provided by AI technician. AI technician or Veterinarian diagnose the pregnancy by rectal palpation.

**G. Health Therapeutics and Preventive Management**

There is a least prevalence of infectious diseases in the farm. When any symptom of sickness arises the farmer calls a veterinarian. Anthelmentic treatment and vaccination is regularly practiced by the farm owner.

**Table: 5 Vaccination program that follow in Jorif Dairy Farm**

|  |  |  |
| --- | --- | --- |
| **Name of the vaccine** | **Frequency of use** | **Groups of animals administered** |
| FMD Vaccine | thrice/year | Non pregnant |
| BQ Vaccine | Twice/year | Non pregnant |
| Anthrax vaccine | once /year | Non pregnant |

**Table :6 Anthelmentic Treatment followed in Jorif farm**

|  |  |  |
| --- | --- | --- |
| **Name of Anthelmentics** | **Frequency of use** | **Dosage** |
| Antiworm bolus®(Levamisole +Trichlabendazole) | Every 3months alternate | 1 bolus /75kg body wt.  |
| Endex ® (Levamisole +Trichlabendazole) | Every 3months alternate | 1 bolus /75kg body wt. |

**3.5. Sample collection and separation of serum**

5 ml of blood sample was collected from jugular vein with taking proper aseptic measures. After collection of blood all samples were kept in Vaccutainer tube .Then for proper coagulation,it was kept in room temperature for 1-2 hours. After coagulation it was centrifuged@ 3000 rpm for 15 minutes. Then serum was collected and kept in Ependorf tube. Then that Ependorf tube containing serum was further centrifuged@ 3000 rpm for 15 minutes. From this Ependorf tube separated clear serum was kept in another Ependorf tube for analysis.

**3.6. Preservation of collected serum**

Collected serum was preserved with using tag no. in deep freezer (-800 C) upto analysis

**3.7. Biochemical Examination**

After collection of serum from blood sample various biochemical tests (Glucose, Total protein, Albumin, Calcium and phosphorus) were determined by biochemical analyzer (Humalyzer-3000) in physiology lab.Of Chittagong Veterinary and Animal Sciences University.



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**Fig: Activities at physiology lab of CVASU.**

**3.7. Statistical Analysis**

All values (glucose, total protein, albumin, calcium, phosphorus) of the total 100 (50 pregnant and 50 non pregnant) samples were stored in Microsoft Excel 2007 and then analyzed by paired t-test with using software : STATA/IC-11.

**CHAPTER-IV**

**RESULTS AND DISCUSSION**

**4.1. Serum Biochemistry Result**

**Table-07** Biochemical parameters in pregnant and non pregnant cattle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Serum parameters** | **Pregnant** | **Non pregnant** |  | **P- value** |
| **Mean±****Standard****error** | **95% Conf. Interval** | **Mean±****Standard****Error** | **95% Conf. Interval** | **Reference****Value** |
| **Glucose**(mg/dl) | 66.82 ±6.35 | 54.06- 79.58 | 62.76 ± 6.76 | 49.18- 76.34 | 45-75 | 0.6603\* |
| **Total Protein**(gm/l) | 81.58 ± 2.16 | 77.24- 85.93 | 83.78 ± 2.01 | 79.74- 87.82 | 67.4-74.6 | 0.4433\* |
| **Albumin**(gm/l) | 16.99 ± 2.49 | 11.99- 21.99 | 24.58 ± 4.98 | 14.56- 34.50 | 3.03-3.55 | 0.1190\* |
| **Calcium**(mg/dl) | 23.23 ± 2.43 | 18.35- 28.12 | 20.22 ± 1.91 | 16.39- 24.04 | 9.7-12.4 | 0.1195\* |
| **Phosphorus**(mg/dl) | 6.51 ±.28 | 5.94- 7.08 | 7.19 ± .438 | 6.31- 8.07 | 5.1-9.3 | 0.1797\* |

\*= P> .05 (Insignificant in 95% confidence interval).

**Glucose**

Glucose level insignificantly vary between pregnant cattle and non pregnant cattle i.e. 66.82 ±6.35 (mg/dl) and 62.76 ± 6.76 (mg/dl). (Table- 01)

**Total protein**

Total Protein level insignificantly vary between pregnant cattle and non pregnant cattle i.e. 81.58 ± 2.16 (gm/l) and 83.79 ± 2.01 (gm/l). (Table- 01)

**Albumin**

Albumin level insignificantly vary between pregnant cattle and non pregnant cattle i.e. 16.99 ± 2.49 (gm/l) and 24.58 ± 4.98 (gm/l). (Table- 01)

**Calcium**

Calcium level insignificantly vary between pregnant cattle and non pregnant cattle i.e. 23.23 ± 2.43(mg/dl) and 20.22 ±1.91 (mg/dl). (Table- 01)

**Phosphorus**

Phosphorus level insignificantly vary between pregnant cattle and non pregnant cattle i.e. 6.51 ± .28 (mg/dl) and 7.19 ± .44 (mg/dl). (Table- 01)

**4.2. Discussion on Serum biochemistry**

**4.2.1. Glucose**

Glucose level found in pregnant and non pregnant cattle were 66.82 ± 6.35 (mg/dl) and 62.76 ± 6.76 (mg/dl) respectively and it was insignificantly differ**.**

Biochemical changes in different periods of gestation was 57.22 ± 2.41(mg/dl), 58.22 ± 1.89 (mg/dl) and 56.35 ± 2.30 (mg/dl) in 1st period (30-90 days), 2nd Period (91-180 days) and 3rd period (181 days onwards) respectively(Roy *et al.,* 2010).

**4.2.2. Total protein**

Total Protein level found in pregnant cattle and non pregnant cattle were 81.58 ± 2.16 (gm/l) and 83.784 ± 2.01 (gm/l) respectively and it was insignificantly differ**.**

Biochemical value of blood of Mature Angoni Cattle was 83.8±7.5 (gm/l) (Otto *et al.,* 2010).This result was slightly similar to this study.

In the seventh and in the eighth months of pregnancy the total serum protein was 74.8 ± 3.48 (gm/l) in the 8th; 75.7 ± 4.50 (gm/l) in the 9th month of pregnancy (Zvorc *et al.,* 2000). This result was slightly similar to the result of total protein level of pregnant cattle of this study.

**4.2.3. Albumin**

Albumin level found in pregnant and non pregnant cattle were 16.99 ± 2.49 (gm/l) and 24.578 ± 4.98 (gm/l) respectively and it was insignificantly differ**.**

During pregnancy, maternal tissues are involved in providing energy for reproduction processes, which may affect blood serum chemistry values, affected also by several other factors as breed, age, malnutrition, foetal growth, or season (Swanson *et al*. 2004; Yokus *et al*. 2006). In this study albumin level of blood of pregnant cattle was lower than non pregnant cattle. This decrease level of albumin was due to fulfill the requirements of the fetus.

During pregnancy there is a tendency for an albumin concentration decrease on the one hand, and a globulin concentration increase on the other (Kaneko, 1989).

Albumin concentration decreases and reaches its lowest point in the middle of pregnancy, it then gradually increases to a point where it is within the normal value limits, where it remains until the moment of foaling (Kaneko, 1989). In this study the level of albumin in pregnant cattle was lower than the non pregnant cattle. So,in pregnant condition albumin level decrease.

**4.2.4. Calcium**

Calcium level found in pregnant and non pregnant cattle were 23.23 ± 2.43 (mg/dl) and 20.22 ± 1.91 (mg/dl) respectively and it was insignificantly differ**.** Calcium level of pregnant cattle is slightly higher than non pregnant cattle. It may due to extra care of the pregnant cattle.

**4.2.5. Phosphorus**

Phosphorus level found in pregnant cattle and non pregnant cattle were 6.51 ± .28 (mg/dl) and 7.19 ± .44 (mg/dl) respectively and it was insignificantly differ**.** It indicated that due to pregnancy the phosphorus level of blood was slightly decreased. In pregnant condition fetus need more phosphorus for development. Due to fulfill the requirement of the fetus the phosphorus level of the blood of the pregnant cattle might be lower than the phosphorus level of the blood of non pregnant cattle.

Biochemical changes in different periods of gestation was 6.31±2.40 (mg/dl), 6.23 ± 01.51 (mg/dl), 6.39 ± 2.44 (mg/dl) in 1st period (30-90 days), 2nd Period (91-180 days) and 3rd period (181 days onwards) respectively (Roy *et al.,* 2010).These phosphorus levels were slightly similar to this study.

**CHAPTER-V**

**CONCLUSION**

Pregnant and non pregnant stages are physiologically different conditions. In pregnant condition various changes are observed that are usually absent in non pregnant condition. The study was conducted to verify the variation in blood parameters between pregnant and non pregnant cattle. The present study reveals that there was insignificant difference between the blood parameters of pregnant and non pregnant cattle. It may occur due to various conditions like sampling error, lactation stages, feeding habit, age etc. Genetic and breed also effect the result. But according to this analysis, it was ensure that there was no significant difference present between pregnant and non pregnant cattle.

Finally biochemical values were an efficient tool for evaluation of physiological status. Metabolic disorders, management problem of the farm which had great relation to health status of the animal.

**RECOMMENDATION**

Age, sex, breed, season, feeding habit, different stages of lactation, different stage of pregnancy, quality of feed etc. may affect the different parameters,(Glucose, total protein, albumin, calcium, phosphorus).

So, further study to be conducted for drawn out the final conclusion of the study.

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**APPENDIX**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Glucose(P)** | **Glucose(NP)** | **TP(P)** | **TP(NP)** | **ALB(P)** | **ALB(NP)** | **CA(P)** | **CA(NP)** | **P(P)** | **P(NP)** |
| 92.4 | 10.1 | 82.2 | 97 | 26.8 | 35.7 | 5.6 | 13 | 9.5 | 6.4 |
| 51.6 | 8.3 | 85.3 | 90.4 | 28.3 | 38.5 | 8.9 | 9.8 | 5.9 | 8.9 |
| 72.5 | 53.4 | 83.9 | 95.4 | 40.7 | 32 | 9.9 | 9.3 | 9.3 | 10.4 |
| 125.1 | 10.9 | 84.4 | 88.6 | 55.3 | 39.8 | 10.2 | 6.5 | 9.2 | 6.7 |
| 74.8 | 6.5 | 74.4 | 85 | 31.4 | 33.1 | 10 | 10.4 | 3.1 | 11.4 |
| 101.6 | 28.8 | 88.4 | 89.8 | 40.3 | 34.1 | 9.7 | 6.5 | 8.2 | 12.3 |
| 68.4 | 106.2 | 89.6 | 87.4 | 55 | 43.8 | 7 | 11.8 | 8.1 | 9.3 |
| 81 | 60 | 67.9 | 92.3 | 40.9 | 33.7 | 7.4 | 6.6 | 5.2 | 12.1 |
| 62.1 | 64.4 | 82 | 97.6 | 41.3 | 30.8 | 9.4 | 9.9 | 7.3 | 3.4 |
| 92.9 | 61.1 | 69.5 | 80.7 | 27.7 | 34.5 | 8.3 | 7.6 | 7.1 | 6.3 |
| 81.4 | 79.2 | 77.9 | 96.4 | 48.7 | 27.7 | 6.1 | 10.9 | 6.5 | 4.1 |
| 90 | 82.8 | 83.6 | 68.4 | 30.8 | 52.9 | 7.6# | 9.6 | 3.5 | 12.3 |
| 72.5 | 61.7 | 85.5 | 106.5 | 33.1 | 35.8 | 7.9 | 9.3 | 6.2 | 11.4 |
| 94.7 | 86.3 | 89.5 | 93.4 | 38.5 | 32.9 | 8.4 | 9.6 | 3.5 | 10.3 |
| 100.7 | 58.4 | 84.4 | 90 | 30.8 | 2.7 | 10.4 | 6.7 | 4.3 | 9.4 |
| 67.8 | 72.4 | 101.1 | 87.4 | 35.7 | 40.6 | 9.8 | 10 | 8.3 | 13.3 |
| 321.3 | 83.8 | 104.2 | 85.1 | 32 | 31.9 | 8.4 | 9.9 | 5.2 | 12.3 |
| 78.3 | 65.2 | 115.9 | 89 | 34.5 | 38.9 | 8.6 | 8.5 | 8.1 | 16.2 |
| 72.4 | 15.8 | 113.3 | 87.7 | 52 | 100.9 | 7.6 | 7.9 | 7.3 | 6.2 |
| 30.8 | 19.3 | 68.3 | 103.3 | 4.9 | 226.9 | 21.5 | 8.9 | 4.5 | 5.9 |
| 45.4 | 96.7 | 69.2 | 112.2 | 5.4 | 32.6 | 13.7 | 9.3 | 5.2 | 8.3 |
| 46 | 336.9 | 61.4 | 89.4 | 4.9 | 35.7 | 26.9 | 8.5 | 7.6 | 5.3 |
| 24.8 | 93.2 | 66.4 | 87.8 | 4.4 | 30.1 | 31.5 | 7.3 | 6.1 | 8.2 |
| 34.1 | 86.9 | 77.2 | 84.2 | 4.5 | 35.7 | 30.8 | 12.4 | 4.3 | 3.1 |
| 21.4 | 84.2 | 61.5 | 89.3 | 3.7 | 38.5 | 14.2 | 13.8 | 3.1 | 6.4 |
| 20.6 | 35.5 | 58.5 | 56.3 | 2.9 | 5.1 | 10.9 | 31.7 | 2.9 | 2.8 |
| 23.8 | 43.4 | 67.7 | 61.1 | 3.8 | 4.1 | 54.5 | 23.9 | 5.2 | 3.7 |
| 37 | 49.6 | 63.6 | 58 | 4.6 | 4.5 | 16.9 | 35.1 | 4.2 | 4.6 |
| 32.6 | 31.5 | 72.1 | 72.1 | 3.6 | 4.3 | 14.4 | 17.4 | 7.1 | 5.3 |
| 23.4 | 40.2 | 74.9 | 75.8 | 3.7 | 5.3 | 16.1 | 51.4 | 9.4 | 4.7 |
| 50 | 26.5 | 91.5 | 71.7 | 3.6 | 4.5 | 30.6 | 14.2 | 6.3 | 5.1 |
| 24.1 | 33.9 | 91.2 | 75.9 | 3.5 | 4.1 | 69.1 | 61.5 | 5.9 | 3.8 |
| 34.8 | 39 | 80.3 | 64.8 | 4.9 | 3.8 | 47.7 | 25.2 | 6 | 4.2 |
| 63.8 | 52.1 | 65.8 | 56.3 | 3.1 | 4.3 | 62 | 47.1 | 4 | 5.6 |
| 38 | 35.6 | 87.1 | 66.2 | 3.5 | 6.1 | 71.5 | 32.1 | 12 | 8 |
| 31.2 | 73.5 | 108.6 | 88.8 | 3.6 | 3.2 | 46.9 | 24.8 | 7.7 | 6 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Glucose(P)** | **Glucose(NP)** | **TP(P)** | **TP(NP)** | **ALB(P)** | **ALB(NP)** | **CA(P)** | **CA(NP)** | **P(P)** | **P(NP)** |
| 33.1 | 85.8 | 50.2 | 103.9 | 2.7 | 4.9 | 38.7 | 29.5 | 6.5 | 6.5 |
| 41.7 | 48.7 | 59 | 81.2 | 2.7 | 3.1 | 19.1 | 26.3 | 5.5 | 5.8 |
|  61.7 | 52.9 | 85 | 95 | 4.7 | 5 | 27.1 | 28.7 | 6.5 | 5 |
| 73.7 | 81 | 72.6 | 73.6 | 4.6 | 4.1 | 27.7 | 28.4 | 7.1 | 5.8 |
| 84.9 | 83.5 | 82.2 | 81 | 4.9 | 3.8 | 30.4 | 25.9 | 10 | 7 |
| 78.3 | 70.5 | 72.7 | 98.1 | 4.4 | 4.6 | 27.3 | 27.6 | 8.7 | 9.5 |
| 97.7 | 79.3 | 83.9 | 104 | 5.1 | 4.9 | 29.6 | 28.9 | 6.5 | 6.9 |
| 82.4 | 95.8 | 99.1 | 65 | 4.4 | 4.4 | 27.8 | 28 | 5.9 | 5 |
| 74.8 | 91.3 | 111.7 | 104.1 | 3.7 | 3.9 | 27.3 | 27.9 | 7.2 | 6.6 |
| 78.3 | 40.8 | 80.1 | 59.3 | 3.3 | 4.7 | 27.6 | 35.3 | 6.9 | 3.7 |
| 67.6 | 32.8 | 108.1 | 69 | 4.2 | 4.6 | 28.6 | 17.7 | 6 | 3.4 |
| 63.9 | 31.4 | 90.4 | 72.3 | 5.3 | 4.6 | 26.9 | 50.5 | 4.8 | 4.9 |

Note: P- Pregnant cattle, NP- Non-pregnant cattle.