ANALYSIS OF PROXIMATE COMPOSITIONS OF COW, GOAT AND POULTRY BLOOD FOR USE IN AQUACULTURE FEED, BANGLADESH

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ABSTRACT

The proximate compositions (percentage of protein, fat, ash, moisture and carbohydrate) of the chicken, cow and goat blood were studied. For this analysis blood samples were collected from the slaughter house. Three samples were cocked first and then the samples were sun dried and finally made powder by grinder. This powder stored in the vial and plastic jar for proximate analysis. For chicken blood the percentage of protein, fat, moisture, ash and carbohydrate were 84.87%, 1.59%, 4.98%, 4.67%, and 3.88% respectively. For cow blood the percentage of protein, fat, moisture, ash and carbohydrate were 89.68%, 1.28%, 4.23%, 2.53%, and 2.28% respectively. For goat blood the percentage of protein, fat, moisture, ash and carbohydrate were 88.76%, 1.48%, 4.92%, 2.16%, and 2.68% respectively. Percentage of protein content was similar between the cow and goat blood but less in chicken blood. Percentage of fat content was similar among the chicken, cow and goat blood. Percentage of ash content was similar between the cow and goat blood but more in chicken blood.

Keyword: *Proximate, Composition, Blood, Powder, etc.*

1. INTRODUCTION

Blood meal is a dry, inert powder made from blood used as a high protein fish and animal feed ingredients and a high nitrogen fertilizer. It is one of the highest non-synthetic sources of nitrogen. It usually comes from cattle as a slaughterhouse by-product. It may also be used as an animal food supplement for cattle, fish and poultry and in fact widely used due to high lysine content (Henry et al, 1915). In some countries, it is mixed with molasses before use as animal feed.

The practice of fish culture is very old. For centuries the people of Indo-Pacific region and above all the Chinese have reared fish. In this subcontinent fish culture is ancient in certain regions and advances in aquaculture are very recent. Bangladesh is a developing country. Aquaculture is one of the glorious and prosperous sectors for any

developing country to progress its purposes. In aquaculture semi-intensive and intensive farming systems are generally used for better production. On this respect fertilizer and feed will have to be provided for those systems. So, fish and shrimp nutrition have become one of the most important researches and development components, within aquaculture development. Feeds are used composed by protein, fat, moisture, ash and carbohydrate. The major sources of these products are soyabean meal, dry fish, meat and bone meal etc in Bangladesh. Cow, Goat and Poultry Blood from slaughterhouse can be good sources for required protein, fat, moisture, ash and carbohydrate.

Bangladesh is very rich in inland capture fish production. But now- a- days, capture fish production is decreasing day by day due to different causes. Such as agricultural pollution, industrial pollution, natural calamity etc. Fishes of the beels along with other aquatic organisms are silent victims of chlorine sub-lethal toxicity resulting from different types of pollutants (Bernet et Al, 1999). Fish production is also decreasing due to natural causes like flood, drought etc (Chakraborty, 2009). As a result, to fulfill the fish protein requirements, culture fisheries are very much needed. In this perspective, many feed mills and industries have been developed in this country. At present there are about 54 poultry and fish feed companies as well as about 25 commercial fish feed industries in Bangladesh (Rob, 2008). Many of them import feed ingredients from abroad at a higher cost. For example blood meal is mainly imported from India (ACI godrej company, Bangladesh).

If we take proper step to produce aquaculture feed, at first we should emphasize on local and available ingredients. As a result quality aquaculture feed ingredients should be produced like cow, goat and poultry blood meals which will be very helpful to our fisheries sector.

People of this country have been practicing aquaculture from long time before and were depend on natural feed. Now aquaculture practice is increasing and moving traditional to industrial operation. For industrial and commercial operation there must need of artificial feed. For increasing the production we must need to introduce intensive aquaculture systems. Intensive aquaculture systems need a plenty of feed. Better feed composition will result in higher fish production and lower feed cost. In feed development, there should have a provision of continuous investigation of raw materials and feed management in the mills and industries. So blood meal can be used more as a good protein enriched ingredients for aqua feed.

Around 3.5 million cattle are slaughtered annually in Bangladesh of which 40 percent are imported through cross-border trade. Around 15 million goats are slaughtered annually mostly of local origin. Of the total slaughter of cattle and goats around 40 percent is performed during Eid-Ul- Azha. There are currently an estimated around 100,000 commercial poultry farms in Bangladesh and about 55 million chicken is slaughtered annually, produce huge amount of blood (Ministry of Fisheries and Livestock, Bangladesh 2007).

Average live weight of indigenous cattle is 167.64±79.93 kg and contains 6.35±0.69 kg of blood of each (MM Ali et al, 2013). Cattle contain 2.4-8% blood of their weight and approximately 50-60% blood is collected during bleeding in the slaughter operation of about 6-8 minutes. Chicken contains 10% blood of its body weight. That is, 2 kg weight chicken (Boiler) contains about 200 ml liquid bloods.

In cattle and poultry blood meal, major nutrient components are present namely protein, fat, ash, moisture and carbohydrate. Due to its high nutritional value and various commercial aspects, now- a- days, blood is becoming an important feed ingredient in many parts of the world.

2. MATERIALS AND METHODS

The present research works carried out by sample collection and another one is laboratory analysis.

2.1 Sample collection

Cattle (Cow and Goat) blood sample was collected from a slaughter house of Hathazari and chicken blood sample was collected from Chowdhuyhat. Plastic jar, poly bag, grinder, spoon and big dish were used for collection.

2.2 Procedure of sample collection

At first contact to the slaughter house for collecting the cattle blood sample. The slaughterer agreed to supply blood from the slaughter house. On a specific day I collected the require sample on my provided plastic jar.

For the chicken blood sample, I contact with the seller of chicken and he also agreed to provide chicken blood. On a fix day I collected the blood the sample on my provided plastic jar.

2.3 Sample preparation

Cooking blood → expressing the excess water → drying blood→ granular product

The collected samples were taken into the pot and cooked for expressing out the excess water. Then the samples were taken into two big different dishes and put them in sun light for sun drying. The samples were sun dried until they become completely dried.

The samples were taken into the lab and were grinded leaving a certain amount for determining moisture and ash. By the grinding machine the dried samples were made into powder of about 0.1 mm size.

Then the samples were stored in two different airtight vials. At last the samples were stored in the laboratory for proximate analysis.

3. LABORATORY ANALYSIS

3.1 Determination of moisture (Oven method)

The wet sample is allowed to dry by keeping it in an oven at $(100\text{-}105)^0$c about 2-3 hours and cooling in desiccators. The differences between the wet weight and dry weight of the sample give the amount of moisture present in the sample.

3.2 Calculation

$$\% \text{ of moisture} = \frac{\text{Wet weight of sample - Dry wet of sample}}{\text{Wet weight of sample}} \times 100$$

3.3 Determination of Ash (Muffle- Furnace Method)

By heating the sample to high temperature at $(550\text{-}600)^0$c all the organic constituents are burnt down and the inorganic constituents are turned into the form of ash (Pearson 1976).

3.4 Calculation

Weight of ash= (weight of ash+ crucible) - weight of crucible % of ash content = (weight of ash of sample) × 100

3.5 Determination of protein (Micro - kjeldahl method)

The nitrogen of the protein is converted to acid ammonium sulphate by digesting with 36 N sulfuric acid in presence of catalyst mixture. On making the reaction alkaline, the liberated ammonia is distilled off and absorbed in boric acid solution containing an indicator. Change in $_p$H of the acid solution due to addition of ammonia in indicated by the indicator dye. When complete absorption is ensured the solution is back titrated with standard 0.1 N HCl. The amount of hydrochloric acid consumed in back titration of the ammonia absorbed boric acid solution is proportional

to the amount of ammonia liberated. Percentage of nitrogen is calculated by the titrate value, which is converted into (gm%) protein present in the sample by multiplying the percentage nitrogen with factor 6.25. The factor (6.25) is used as for conversion because in average, protein contains 16% of nitrogen.

3.6 Calculation

$$\% N = \frac{\text{Amount of HCl required} \times \text{normality of HCl} \times 0.041 \times 100}{\text{Weight of sample}}$$

Percentage of protein= % of nitrogen × conversion factor
(Conversion factor for animal is 6.25)

3.7 Determination of Fat (Soxhlet extraction method)

Fat can be determined by extracting the material paste with light petroleum in a Soxhlet type extractor and the extract is weight after careful recovery of the solvent. It is advisable to extract the sample first with 99% alcohol only to ensure maximum surface expose of the sample so that free and bound fat can be freely be extracted by extracting solvent.

3.8 Calculation

Percentage of fat was calculated in under way

$$\% \text{ of fat} = \frac{\text{Weight of fat after complete evaporation of solvent}}{\text{Weight of the crushed sample}} \times 100$$

3.9 Determination of Carbohydrate

Total carbohydrate which was present as glycogen was determined by simply subtracts after complete estimation of proximate analysis of Protein, Fat, Moisture and Ash from 100.

3.10 Calculation

% of carbohydrate content= 100- percentage of (protein+ fat+ moisture+ ash)

4. RESULT AND DISCUSIONS

4.1 Percentage of protein, fat, moisture, ash and carbohydrate of sun-dried chicken blood

The amount of protein, fat, moisture, ash and carbohydrates in sun dried chicken blood were 84.87%, 1.59%, 4.98%, 4.67% and 3.89% respectively. Protein percentage was so high in sun dried chicken blood and it was more than the meat and bone meal that is used for fish and poultry feed formulation. Fat was low due to tender age of the chicken, and it would be increased after the adult age. Moisture, ash and carbohydrates were in considerable amount in the chicken blood.

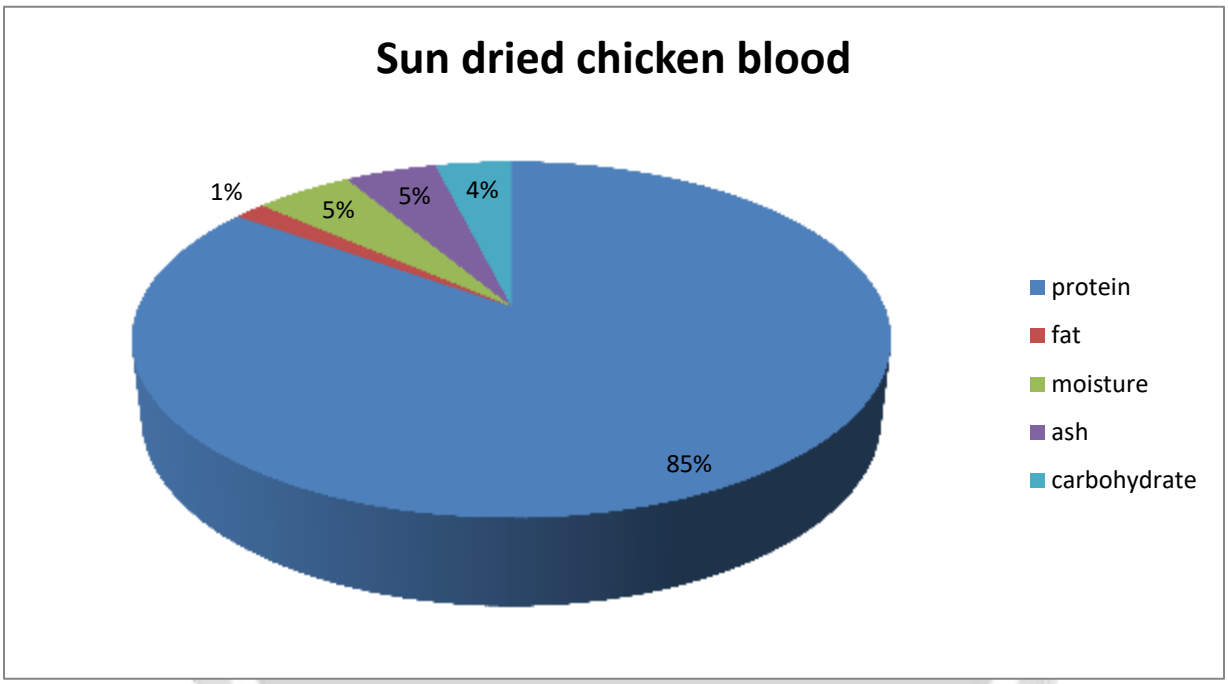

Fig-1: The percentage of protein, fat, moisture, ash and carbohydrate of sun-dried chicken blood

4.2 Percentage of protein, fat, moisture, ash and carbohydrate of sun-dried cow blood

The amount of protein, fat, moisture, ash and carbohydrates in sun dried cow blood were 89.68%, 1.28%, 4.23%, 2.53% and 2.28% respectively. Protein percentage was also high in sun dried cow blood and it was more than the sun dried chicken blood tested. It was also very high than meat and bone usually used for fish and poultry feed formulation. Fat was low in cow blood like chicken blood. Moisture, ash and carbohydrates were also in considerable amount in the sun dried cow blood.

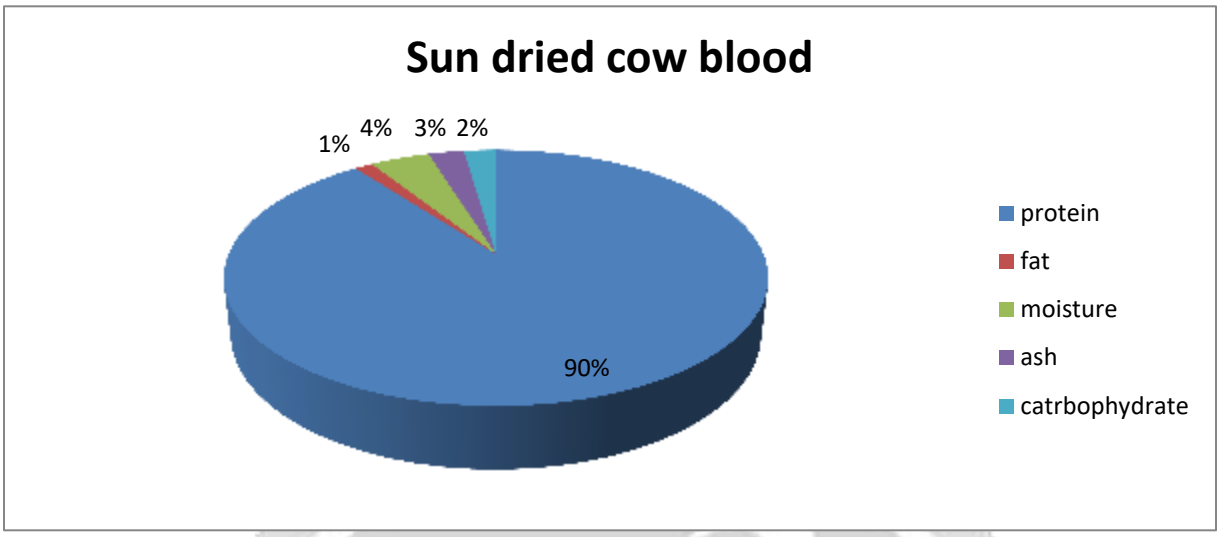

Fig-2: The percentage of protein, fat, moisture, ash and carbohydrate of sun-dried cow blood

4.3 Percentage of protein, fat, moisture, ash and carbohydrate of sun-dried goat blood

The amount of protein, fat, moisture, ash and carbohydrates in sun dried goat blood were 88.76%, 1.48%, 4.92%, 2.16% and 2.68% respectively. Protein percentage was also high in sun dried goat blood and it was more than the sun dried chicken blood but less than the sun dried cow blood tested. It was also very high than meat and bone that is used for fish and poultry feed formulation. Fat was low in goat blood but higher than cow blood and less than chicken blood. Moisture in goat blood was higher than cow blood and less than chicken blood. Ash and carbohydrates were also in considerable amount in the sun dried goat blood and less than sun dried chicken blood.

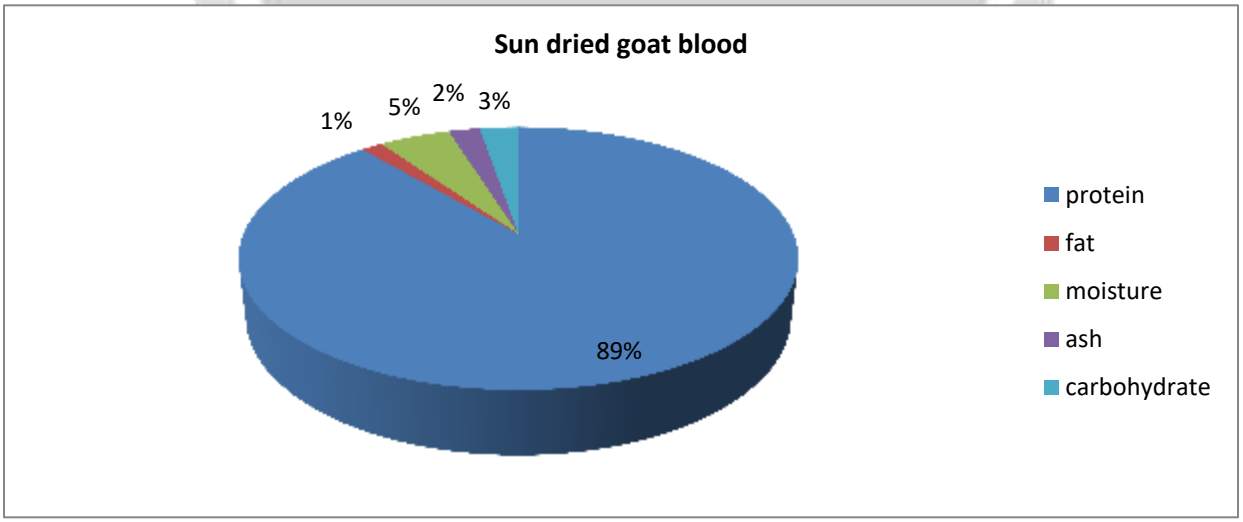

Fig-3: The percentage of protein, fat, moisture, ash and carbohydrate of sun dried goat blood

Protein percentage in chicken blood, cow blood and goat blood is 84.87%, 89.68% and 88.76% which revealed that these bloods are highly rich in protein. Protein rich ingredients are mostly demanded in aquaculture feed

formulation. So, it can be easily said that these bloods from the chicken, cow and the goat can be used in aquaculture feeds formulation, but matter is to collect these bloods in a hygienic way.

4.4 Variation of protein content among the sun-dried chicken, cow and goat blood

Higher percentage of protein content recorded for cow blood and lowest for chicken blood.

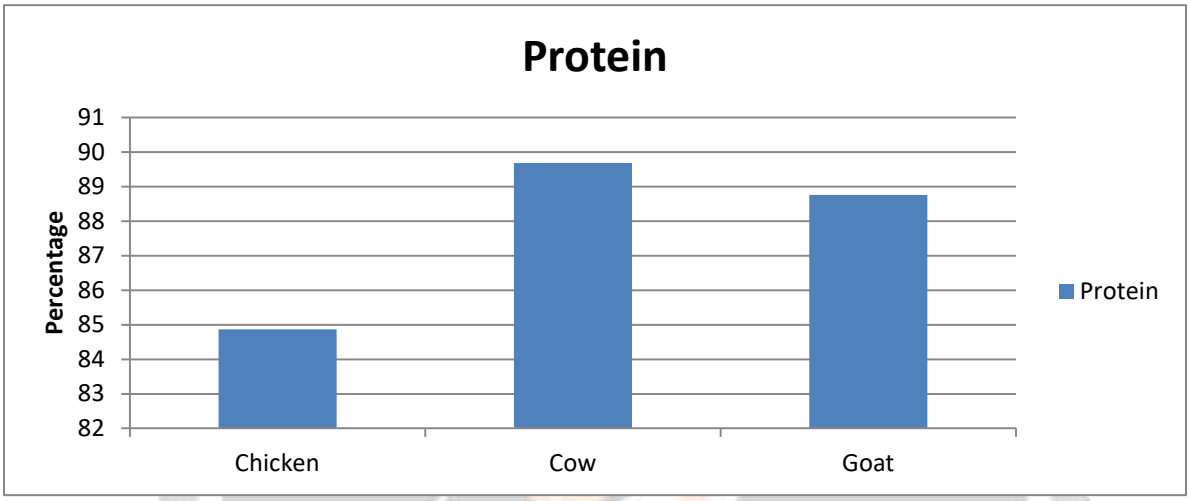

Fig-4: Variation of protein contents among the sun-dried chicken, cow and goat blood

4.5 Variation of fat content among the sun-dried chicken, cow and goat blood

Higher percentage of fat content recorded for chicken blood and lowest for cow blood.

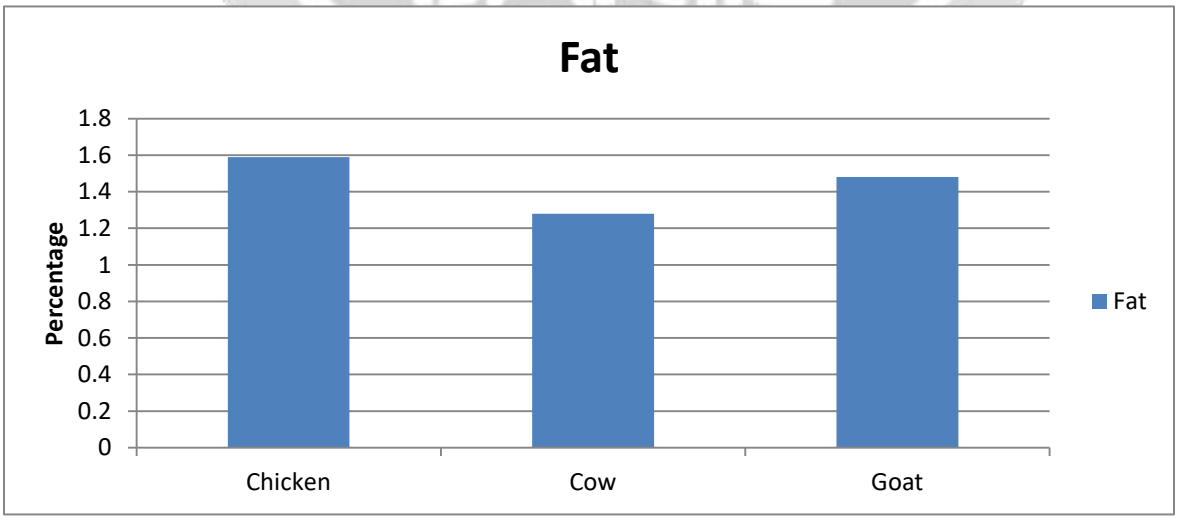

Fig-5: Variation of fat contents among the sun-dried chicken, cow and goat blood

4.6 Variation of moisture content among the sun dried chicken, cow and goat blood

Higher percentage of moisture content recorded for chicken blood and lowest for cow blood.

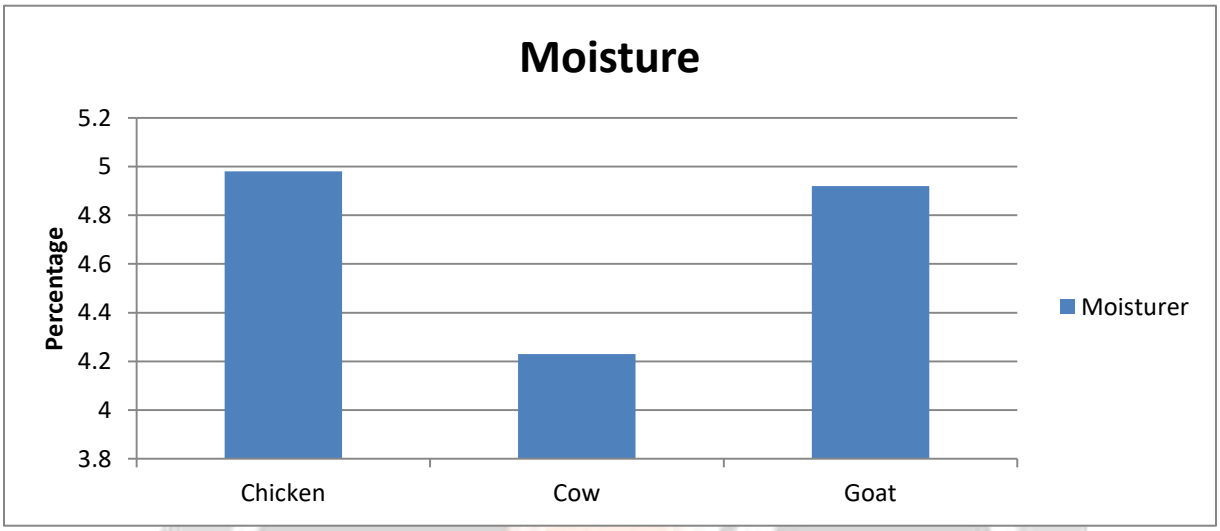

Fig-6: Variation of moisture contents among the sun-dried chicken, cow and goat blood

4.7 Variation of ash content among the sun-dried chicken, cow and goat blood

Higher percentage of ash content recorded for chicken blood and lowest for cow blood.

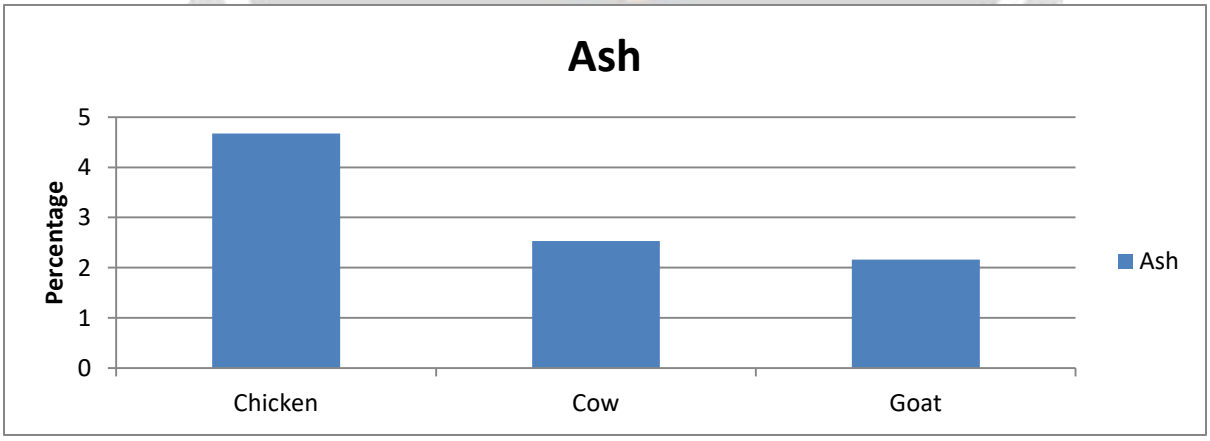

Fig-7: Variation of ash contents among the sun dried chicken, cow and goat blood

4.8 Variation of carbohydrate content among the sun-dried chicken, cow and goat blood

Higher percentage of carbohydrate content recorded for chicken blood and lowest for cow blood.

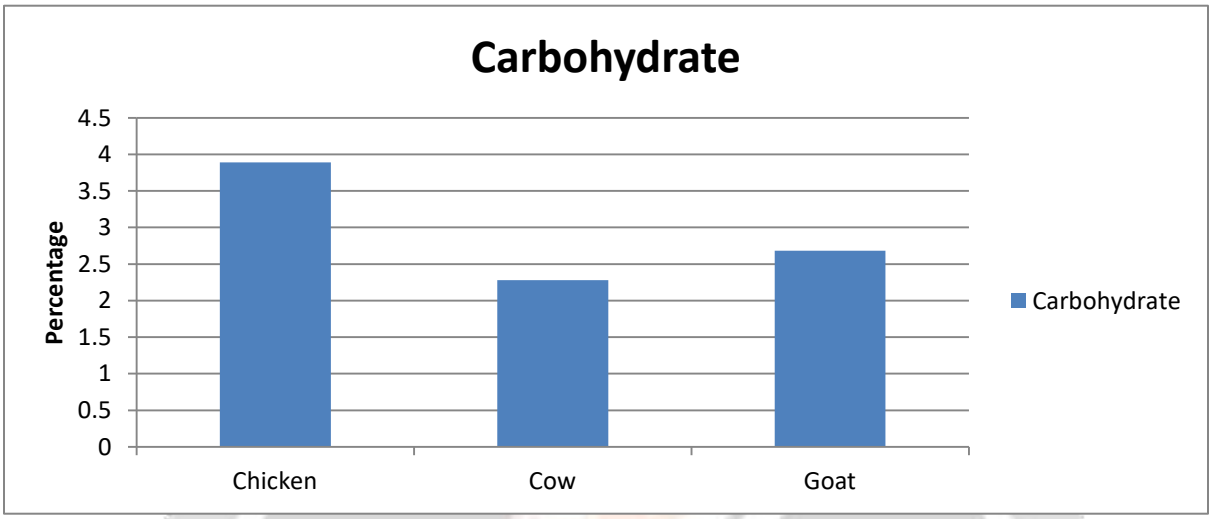

Fig-8: Variation of carbohydrate contents among the sun-dried chicken, cow and goat blood

4.9 Discussion

The proximate composition of protein, fat, moisture, ash and carbohydrate are varying among the sun dried chicken, cow and goat blood. The protein, fat, moisture, ash and carbohydrate content of sun dried chicken blood are 84.87%, 1.59%, 4.98%, 4.67% and 3.88% respectively. According to A. Donkoh et al, (1999) the amount of protein ,fat, moisture, ash and carbohydrate were 85.23%, 1.49%, 7.71%, 2.06% and 3.51% respectively. There is variation in moisture content but similar in protein, fat, carbohydrate content. The protein, fat, moisture, ash and carbohydrate content of sun dried cow blood are 89.68%, 1.28%, 4.23%, 2.53% and 2.28% respectively. According to I. Udo and F. Umoren (2010) the amount of protein ,fat, moisture, ash and carbohydrate were 92.45%, 1.34%, 2.14%, 2.39% and 1.68% respectively which are similar to the present finding. The protein, fat, moisture, ash and carbohydrate content of sun dried goat blood are 88.76%, 1.48%, 4.92%, 2.16% and 2.68% respectively. According to I. Udo and F. Umoren (2010) the amount of protein, fat, moisture, ash and carbohydrate were 91.26%, 1.62%, 2.83%, 2.72% and 1.47% respectively which are similar to the present finding.

5. CONCLUSION

From the present study it is found that the studied of blood are rich in protein content. As we know that protein plays a vital role in muscle growth of animal and fish. So these protein enriched blood meal can be used mixing with the other feed ingredients to make good quality and cost effective aquaculture diets. Also unused blood can cause serious odor problem and deteriorate the water and surrounding environment. If we use these of blood properly, we can control these problems and make proper benefit from those.

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