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Volume 5 (3); May 25, 215

Research Paper

Influence of supplemented whey on growth performance and internal organs percentages of broiler chickens.

Malik H E.E., Elamin K.M., Abdalla S.A. and Dousa B.M.

Online J. Anim. Feed Res., 5(3): 68-73, 2015; pii: S222877011500011-5

Abstract

An experiment was conducted with hundred and sixty, one day old unsexed broilers to investigate the effects of whey protein on growth performance and internal organs percentage. Four dietary treatments, each consisting of 4 replicates. Diets were control with 0% whey protein (diet A) and whey protein was added at 2, 4 and 6% (B, C and D respectively). Traits studied were feed consumption, weight gain, feed conversion ratio, internal organs percentage and dressing percentage. Results revealed that no differences were found in feed consumption, weight gain and dressing percentage among the four treatments, a lower feed conversion ratio was observed in week 5 with control group. There was no effect of whey protein on internal organs except the intestine, abdominal fat and gizzard percentages were significantly ($P < 0.05$) affected by the treatment. Chicks in treated groups reported high estimates of intestine and gizzard than control group. On the other hand, the lowest estimates of abdominal fat were observed by groups A and C. It concluded that up to 6% of whey protein can be incorporated in broilers ration because it's cheaper source of proteins and economically more profitable than control diet. The dietary whey protein seems acceptable and palatable to the birds.

Keywords: Animal Protein, Broilers, Performance.

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Research Paper

Topographic characteristics of the lymph nodes of the dromedary (*Camelus Dromedarius*).

Gavrylin P., Rahmoun D.E., Lieshchova M.

Online J. Anim. Feed Res., 5(3): 74-77, 2015; pii: S222877011500012-5

Abstract

The architecture of the lymph node dromedary (Camelus dromedarius) differs from that shown in the conventional patterns of other mammalian animals, generally formed of a plurality of aggregates, the latter are surrounded by a connective tissue which extends over the whole area surface lymph node and each cluster is a node itself. Vascular distribution in these lymphoid aggregates is relatively abundant and each node receives one or two afferent lymphatic's and is drained by four or five efferent lymphatics. In approximately half of nodes examined, there was extra nodal communications between the lymphatic vessels (afferent and efferent), allowing to bypass the lymph node. Lymph nodes are characterized by their dromedary lobule appearance and size. This lobulated appearance is acquired with age. Indeed in a camel one day we noticed that although the lymph nodes are large, but rather the lobulation is not clear. All forms are possible was lymph nodes ovoid, flattened, elongated, notched, triangular or rounded in some cases.

Keywords: Lymph Nodes, Lymphoid Aggregates, Dromedary, Lobule.

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Research Paper

Performance and nutrient utilization of broilers fed malted sorghum sprout (msp) or wheat-offal based diets supplemented with yeast culture and enzyme.

Oke F.O., Fafiolu A.O., Jegede A.V., Oduguwa O.O., Adeoye S.A., Olorunisola R.A., Oso A.A., Onasanya G.O., Adedire A.O., Muhammed A.I.

Online J. Anim. Feed Res., 5(3): 78-84, 2015; pii: S222877011500013-5

Abstract

An experiment was conducted on a total of two hundred and forty day-old, unsexed Marshal Broiler chickens which were randomly allotted to 8 dietary treatment groups of 30birds each. Each treatment group was replicated 3 times with 10 birds per replicate. The experiment was a 2×4 factorial consisting of two test ingredients (MSP and wheat offal) at 4 levels (0 g kg-1 yeast and enzyme, + 0.01 gkg-1 yeast and enzyme, +0.013 gkg-1 yeast, +0.01 gkg-1 enzyme). At the end of the trial, the effect of MSP and wheat offal with 0.01g/kg-1yeast and those on 0.01 g/kg-1 yeast + 0.01 g/kg-1 enzyme inclusion showed a significant effect ($P<0.05$) for final live weight, weight gain, feed intake and feed conversion ratio and fibre retention. Broiler starter Chickens fed MSP diets had lower ($P<0.05$) final live weight, weight gain, feed intake and fibre retention than those fed wheat offal based diets irrespective of the additives. However, finishing broilers fed wheat offal diet

supplemented with 0.01 g/kg-1 yeast and those on 0.01 g/kg-1 yeast + 0.01 g/kg-1 enzyme recorded a higher (P<0.05) final live weight, weight gain, protein retention and NDF retention than MSP diets. Conclusively, Inclusion of yeast + Enzyme improved protein retention, fat and fibre digestibility. The combination of yeast and Roxazyme enzyme improved the utilization of wheat offal (w/o) and Malted sorghum sprout (MSP) based diets by broiler chickens. It is therefore recommended that MSP supplementation with yeast + enzyme or enzyme singly could be used to improve Livestock rations for better performance.

Keywords: Nutrition, Performance, Broiler, Malted Sorghum Sprout.

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Research Paper

Survey of protozoa parasites infestation of *Synodintis schall* collected from Jabel Awlia dam reservoir at Khartoum state.

Mohamed Ahmed F.A., Yusuf Mohamed A.H., Haroon Ahmed TH.H., Abd-Alkhaier Suleiman H.M., Mohamed A.A., Krpos Kolia W.S., Mohammed Salih R.R., Alamien Babiker A.M.

Online J. Anim. Feed Res., 5(3): 85-89, 2015; pii: S222877011500014-5

Abstract

The main target of the present research to conduct a survey of protozoan parasitic infestation in (*Synodontis schall*) collected from natural environment, study also aimed to identify the protozoan parasite of high parasitic load. 69 samples of fish were examined, 38 male and 31 female on the region of the label Awlia reservoir in the White Nile represented in (*Synodontis schall*) which is one of most consumed species in Khartoum state. This study was conducted in Sudan University of Science and Technology College of Animal Production Science and Technology, Department of Fisheries and Wildlife Science in the period from beginning of April to June 2014. The study revealed that the Haemogregarines was most common parasite obtained in this study with high prevalence rate followed by Trichodina sp, Chilodenella sp, Ich sp, in skin and gill of the mentioned fish as external protozoa. Indoparasite include Hexamita sp., Myxobolus sp., Cryptobia sp., Ichthyobodo sp., and Hennguya sp. Most found in the blood, gonad, liver and kidney respectively as internal parasite. The finding of this study showed prevalence rate of parasite in fish sample examined from skin and gill has high prevalence rate in male than female of studied fish. Also prevalence rate of parasite from internal organ has high prevalence rate of parasite in male than female of the fish study. All the result was analysis by SPSS version 16 by using t-test and the prevalence and means abundance of parasite represent by tables.

Keywords: Parasites, Protozoa, Prevalence, *Synodontis Schall*.

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Research Paper

Profit analysis of traditional beef cattle farm in Minahasa regency, Indonesia.

Dalie S., Wantasen E., Anis S. and Pangemanan S.P.

Online J. Anim. Feed Res., 5(3): 90-94, 2015; pii: S222877011500015-5

Abstract

A traditional beef cattle farm agribusiness needs the development in farmer's way of thinking, from production for family or market need, to production for higher profit, and this could be achieved by adapting the economic principles. The objective of this study was to find out business information for profitable business. This study was carried out on beef cattle farmers group in Kanonang III Village, Kawangkoan District, Minahasa Regency. Results showed that raising 10 beef cattles resulted in the Net Present Value at the DF of 25 % as much as IDR 18,788,330.00, Benefit Cost Ratio (B/C) at the DF of 25 % as much as 1.26, Internal Rate of Return (IRR) as much as 34.21 %, and Break Even Point (BEP) with 6 cattles. It could be concluded that the number of 10 cattles in Kanonang III Village, Kawangkoan District, Minahasa Regency, is suitable for production, with BEP achieved at the raising of 6 beef cattles. Therefore it was recommended that beef cattle farmer in Minahasa Regency should raise more than 6 cattles in order to be able to gain some profit.

Keywords: Profitability, Break Even Point (BEP), Beef Cattle.

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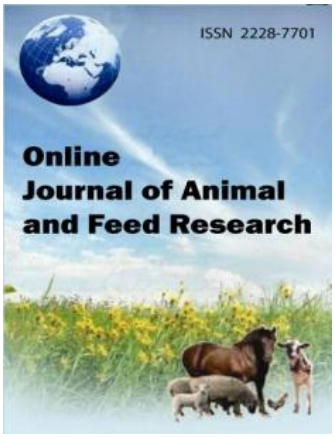

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INFLUENCE OF SUPPLEMENTED WHEY ON GROWTH PERFORMANCE AND INTERNAL ORGANS PERCENTAGES OF BROILER CHICKENS

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ABSTRACT*:* An experiment was conducted with hundred and sixty, one day old unsexed broilers to investigate the effects of whey protein on growth performance and internal organs percentage. Four dietary treatments, each consisting of 4 replicates. Diets were control with 0% whey protein (diet A) and whey protein was added at 2, 4 and 6% (B, C and D respectively). Traits studied were feed consumption, weight gain, feed conversion ratio, internal organs percentage and dressing percentage. Results revealed that no differences were found in feed consumption, weight gain and dressing percentage among the four treatments, a lower feed conversion ratio was observed in week 5 with control group. There was no effect of whey protein on internal organs except the intestine, abdominal fat and gizzard percentages were significantly ($P < 0.05$) affected by the treatment. Chicks in treated groups reported high estimates of intestine and gizzard than control group. On the other hand, the lowest estimates of abdominal fat were observed by groups A and C. It concluded that up to 6% of whey protein can be incorporated in broilers ration because it's cheaper source of proteins and economically more profitable than control diet. The dietary whey protein seems acceptable and palatable to the birds.

Keywords: Animal Protein, Broilers, Performance.

ORIGINAL ARTICLE
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INTRODUCTION

Dairy products have been used as fillers and binders in comminuted meat products to improve texture and sensory properties and minimize cooking losses (Hung and Zayas, 1992). The properties of milk proteins are related to immobilization of water, texture and color improvement and enhancement of sensory properties (Ulu, 2004). Whey protein is widely used in food products because of their high nutritional value and their ability to form gels, emulsions or foams (Lefevre and Subirade, 2003).

Whey proteins provide high levels of essential and branched chain amino acids. However, whey protein isolates are the purest protein source available (Hoffman and Falvo, 2004). During the processing of whey protein isolate there is a significant removal of fat and lactose. As a result individuals who are lactose intolerant can often safely take these products (Geiser, 2003). Dried whey that is produced from its liquid form can be used in chickens (Susmel et al., 1995).

There is extensive research on the using whey protein concentrate in emulsion and emulsion type meat products (Hung and Zayas, 1992; Özdemir et al., 1994; Zt,orba et al., 1994; Hughes et al., 1998; Lyons et al., 1999; Serdaroğlu and Sapancı-Özsümer, 2003; Serdaroğlu and Deniz, 2004). However, there are a few studies on the effect of whey powder and skim milk powder on yield, textural properties and sensory characteristics of patty. Recently, studies highlighted opportunities to use whey proteins as vehicles for bioactive ingredients (Hebrard et al., 2006; Livney, 2010). These ingredients must be consumed orally and should therefore pass through the entire gastro-intestinal tract. Moreover whey proteins have potential as functional food ingredients for persons with obesity (Luhovy et al., 2007). Therefore, the objective of the present study was to determine and to assess the effect of dietary supplementation of whey protein on broiler growth performance and internal organs percentage.

MATERIAL AND METHODS

Experimental birds

One hundred and sixty one-day old unsexed commercial broiler chicks (Hubbard) were purchased from commercial poultry company on arrival chicks were placed in sixteen pens they were fed the control diet ad libitum for 3 days as adaptation period. The chicks were divided into four groups, with four replicates (10 chicks per each).

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Experimental diets

Four experimental diets were formulated from local ingredients with one basal diet. The diets were approximately isocaloric and isonitrogenous with different levels of added whey protein (0, 2, 4 and 6%). The ingredients constituents of experimental diets are shown in Table 1 their calculated compositions are tabulated in Table 2. The experimental diets were formulated and adjusted to meet the nutrient requirement of broiler as outlined by the National Research Council (1994), and subjected to a proximate analysis according to A.O.A.C. (1990).

Table 1 - The ingredients constituents of experimental diets

Ingredients	Whey protein %			
	0	2	4	6
Sorghum	60.2	58.4	58.4	58.4
Groundnut meal	24.2	24	22	20
Sesame meal	5.5	5.5	5.5	5.5
Wheat bran	1.36	1.36	1.36	1.3
Super concentrate	5	5	5	5
Whey protein	0	2	4	6
Di-calcium phosphate	0.74	0.74	0.74	0.74
Limestone	0.24	0.24	0.24	0.24
Salt	0.2	0.2	0.2	0.2
Lysine	0.12	0.12	0.12	0.12
Methionine	0.09	0.09	0.09	0.09
Vegetable oil	2.1	2.1	2.1	2.1
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100

Table 2 - Calculated compositions of experimental diets

Items	Whey protein %			
	0	2	4	6
ME (kcal/kg feed)	3200	3189	3190	3191
CP	23	23.5	23.3	23.2
CF	4.12	4.06	3.86	3.67
Ca	1.04	1.04	1.03	1.02
P	0.45	0.45	0.45	0.44
Lysine	1.22	1.21	1.18	1.16
Methionine	0.51	0.51	0.5	0.49

Carcass preparation

At the end of the experimental period, the birds were starved overnight from feed, whereas waster was available. Eight birds from each treatment (2birds/replicate) were selected randomly then they were leg-tagged then individually weighed and slaughtered. Hot and cold carcass weights were recorded, Carcasses weight was recorded and the dressing percentage was determined by expressing carcass weight to the live weight.

Experimental design and statistical analysis

The experimental design of the trail was a completely randomized design (CRD). The data obtained were tabulated and subjected to analysis of variance (ANOVA) according to Gomez et al. (1984). The significant difference test was used for treatments mean separation.

RESULTS AND DISCUSSION

The results of feeding graded levels of whey protein (0, 2, 4, and 6%) on the performance of broiler chicks are presented in Table 3. The results showed that there were no significant differences ($P > 0.05$) in the total feed intake (g), but it tended to be higher for birds fed the treated diet. The total weight gain (g) and feed conversion ratio (g feed/g gain) were not significantly ($P > 0.05$) affected by the inclusion of whey protein, but the best results of body weight gain and feed conversion ratio were obtained by birds fed the diet contained 6% whey protein

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followed by those fed the other tested diets. Weekly feed intake was not significantly (P > 0.05) different a:mong dietary treatments as shown in Table 4, feed intake tended to be higher for birds fed different levels of whey protein. This increase in the intake might be related to palatability and higher digestibility of whey protein based diets. In addition, the acceptable essential amino acids profile of whey protein which reported by Hoffman and Falvo (2004). The effects of dietary treatments on weekly body weight gain and weekly feed conversion ratio (FCR) are shown in Tables 5 and 6. Results revealed that treatment had significant (P < 0.05) affect on weekly weight gain and feed conversion ratio. Body weight gain was shown to be higher in the first and fifth weeks of age for chickens fed treated diets by increased level of whey protein, despite their similar compared with the birds in the control group. Gulsen et al. (2002); Kermanshahi and Rostami (2006) found that body weight gain to be greater for chickens offered dried whey protein in amounts equivalent to a whey protein level between 3–6 g/kg–1. Broiler chicks offered whey protein had better feed conversion ratio than control. These effects somewhat resemble those reported by Awano (2004) who found that the dietary presence of whey protein counteract the decrease of feed efficiency in broilers when fed diets burdened with added oxidized soybean oil. The findings of the present study on internal organs percentages (intestine, Abdominal fat, Liver, Heart, Spleen, Gizzard) and dressing percentage (Table 7) indicated that intestine, abdominal fat and gizzard percentages were significantly (P < 0.05) influenced by the treatments. Birds fed control diet obtained lower percentage on these parameters than treated groups. Proteins from animal sources (i.e. eggs, milk, and meat) provide the highest quality rating of food sources. This is primarily due to the 'completeness' of proteins from these sources. Although protein from these sources are also associated with high intakes of saturated fats, there have been a number of studies that have demonstrated positive benefits of animal proteins in various population groups (Campbell et al., 1999; Pannemans et al., 1998). However, there were no significant (P > 0.05) influenced for liver, heart, spleen and dressing percentages by the dietary treatments. Feeding economics of experimental diets are presented in Table 8. The result showed that diet D (contained 6% whey protein) is cheapest one, it followed by diets C and B than control. Broiler chicks received diet D recorded the highest profitability than other groups.

Table 3 - Overall performance of broiler chicks as affected by dietary inclusion of whey protein

Parameters	Treatments				±SEM
	A	B	C	D	
Total feed intake (g/bird)	3189.5	3221.0	3197.4	3221.0	55.68
Total body weight gain (g/bird)	1791.5	1751.8	1809.4	1962.5	71.03
Feed conversion ratio (g feed/g bird)	1.84	1.79	1.77	1.63	0.07

Table 4 - Weekly feed intake of broiler chicks as affected by dietary inclusion of whey protein (g/bird)

Weeks	Treatments				±SEM
	A	B	C	D	
1	137.17^{b}	213.17^{ab}	225.67^{a}	219.33^{ab}	10.35
2	341.07	357.57	379.00	380.67	16.19
3	396.23^{b}	438.33^{ab}	492.33^{a}	495.33^{a}	20.79
4	599.34	606.47	611.00	612.07	18.14
5	767.29^{a}	777.70^{a}	700.00^{b}	718.57^{ab}	18.84
6	898.38^{a}	827.77^{ab}	789.37^{b}	770.93^{b}	24.69

Table 5 - Weekly body weight gain of broiler chicks as affected by dietary inclusion of whey protein (g/bird)

Weeks	Treatments				±SEM
	A	B	C	D	
1	81.67^{b}	82.50^{b}	112.00^{a}	120.23^{a}	6.31
2	199.17	196.23	217.17	193.33	12.94
3	203.07	211.83	227.83	208.33	11.59
4	252.75	268.75	256.67	311.83	27.93
5	415.83^{b}	365.20^{b}	344.50^{b}	590.04^{a}	33.76
6	635.80	627.25	633.37	559.87	47.47

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Table 6 - Weekly feed conversion ratio of broiler chicks as affected by dietary inclusion of whey protein (g feed/g bird)

Weeks	Treatments				±SEM
	A	B	C	D	
1	2.30^{ab}	2.59^{a}	2.03^{bc}	1.84^{c}	0.12
2	1.73^{b}	1.82^{ab}	1.75^{b}	1.97^{a}	0.07
3	1.97^{b}	2.08^{ab}	2.16^{ab}	2.39^{a}	0.11
4	2.37	2.30	2.40	2.06	0.20
5	1.33^{c}	2.13^{a}	2.04^{a}	1.73^{b}	0.09
6	1.42	1.33	1.29	1.39	0.12

Table 7 - Internal organs percentage of broiler chicks as affected by dietary inclusion of whey protein (%)

Parameters	Treatments				±SEM
	A	B	C	D	
Intestine	5.18^{c}	7.74^{a}	6.96^{ab}	6.72^{b}	0.28
Abdominal fat	1.05^{c}	1.46^{b}	1.07^{c}	1.85^{a}	0.11
Liver	2.45	2.11	2.70	2.68	0.13
Heart	0.55	0.57	0.61	0.50	0.04
Spleen	0.24	0.23	0.27	0.28	0.03
Gizzard	2.37^{b}	2.96^{a}	2.92^{a}	2.86^{a}	0.15
Dressing	66.06^{a}	61.64^{b}	61.85^{b}	64.04^{ab}	0.93

Table 8 - The feeding economics of experimental diets

Items	Experimental diets			
	A	B	C	D
Sudanese Pounds				
Feed cost per bird (SP)	15.940	15.899	15.397	15.126
Total cost per bird (SP)	18.940	18.899	18.397	18.126
Average weight of bird (kg)	1.257	1.187	1.274	1.307
Total returns (SP)	28.911	27.301	29.302	30.060
Net profit per bird (SP)	9.871	8.402	10.905	11.934
Dollar				
Feed cost per bird ($)	1.771	1.767	1.711	1.681
Total cost per bird ($)	2.104	2.100	2.044	2.014
Total returns ($)	3.212	3.033	3.256	3.340
Net profit per bird ($)	1.108	0.934	1.212	1.326

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TOPOGRAPHIC CHARACTERISTICS OF THE LYMPH NODES OF THE DROMEDARY (*Camelus dromedarius)*

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ABSTRACT*:* The architecture of the lymph node dromedary (Camelus dromedarius) differs from that shown in the conventional patterns of other mammalian animals, generally formed of a plurality of aggregates, the latter are surrounded by a connective tissue which extends over the whole area surface lymph node and each cluster is a node itself. Vascular distribution in these lymphoid aggregates is relatively abundant and each node receives one or two afferent lymphatic's and is drained by four or five efferent lymphatics. In approximately half of nodes examined, there was extra nodal communications between the lymphatic vessels (afferent and efferent), allowing to bypass the lymph node. Lymph nodes are characterized by their dromedary lobule appearance and size. This lobulated appearance is acquired with age. Indeed in a camel one day we noticed that although the lymph nodes are large, but rather the lobulation is not clear. All forms are possible was lymph nodes ovoid, flattened, elongated, notched, triangular or rounded in some cases.

Keywords: Lymph Nodes, Lymphoid Aggregates, Dromedary, Lobule.

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INTRODUCTION

Dromedary lymph nodes are studied but often wrongly attributed in scientific journals. We used several different lymph nodes. Aspects of lymph nodes of the dromedary are discussed. The position of the lymph nodes camel is summarized and illustrated in anatomical charts explaining the position and precise topography of each unit. Studies have been conducted to investigate gross aspects, histological of lymph nodes in dromedaries Gahlot (1992), as was the lack of information on the precise anatomy and topography of the lymph nodes on this animal, we made a very advanced to know with certainty what the lymph node is composed of the dromedary and what is its anatomical structure study. According to the authors, it was found that the morphology and structure (Abdel-Magie (2012), and Osman (1988), lymph node dromedary has intermediate characters that take both the mammalian general that the special case of the pig. This animal is usually kept for meat and it is strongly believed that the detailed anatomical data should be made regarding lymph nodes that they play an important part of the defense mechanism of the body against the invasion of body foreigners (Saunders, 2013). In addition, these lymph nodes, this can be easily palpated in animals during the inspection of the meat. Studies have been conducted to investigate gross, histological aspects of lymph nodes in dromedaries, as was the lack of information about the anatomy and topography of the lymph nodes on this particular animal Barone (1976, 2012) and Cauvet (1925), we had a very advanced knowledge with certainty that the lymph node is composed of the camel and what is the study of the anatomical structure. According to the authors, it was found that the morphology and structure Heath (1986) and Kayouli (1995), lymph nodes dromedary intermediate characters who are both large mammal that the particular case of pigs.

MATERIAL AND METHODS

The present study is carried out in the southern part of Algeria; the location of the desired node was traversed by using a very accurate diagram of the anatomy of the namely animal anatomical topography accurate lymph nodes. The recognition of the location of the 10 lymph nodes, we have collected and studied at the abattoir and laboratory; 5 somatic: (the Parotid, submandibular, superficial cervical, axillary, popliteal) and 5 visceral: (medial retropharyngeal, caudal mediastinal, portal, jejunum).The measurement of the length and width of each lymph node is made after preparation of lymph node using a scalpel Pack of 5 HS No. 10A and the results are listed on Table and lymph nodes were identified by visual inspection of each image. The identification process is purely visual are: analysis of the size, shape, color, location and proximity of the surrounding structures has proven to be useful for the identification of particular lymph node (Heath, 1987). Observations obtained were compared with

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lymph node to better reach a consensus of opinion that has been validated in general in relation to the anatomy atlas. The main characteristics of the majority of lymph nodes detected identified on the images. When the identification process is completed, each lymph node is defined by a contour with a marker and the distribution of the lymph nodes requires a detailed topography of the other organs of the dromedary Mukasa-Mugerwa (1985), which corresponds to a relation between the descriptions of the lymph nodes relative to adjacent organs. The greatest difficulty, however, is the construction of a model of the architecture of the whole lymph node good preparation of lymph node quote us have the details of all of the unit that may have this schema.

RESULTS AND DISCUSSION

The observations were compared to best reach a consensus of opinion that has been validated in general with reference to the atlas of anatomy. The main characteristics of the majority of lymph nodes detected, identified on the images (Table 1).

Table 1 - Number conglomerate form and color of the lymph nodes camel

Lymph nodes	Length of L.N. cm	Width of L.N. cm	Number of kongregate	Form	Color
Parotid	3	1	8	Flattened, elongated	Gray
Sub-mandibular	9	4	15	Ovoid	Light brown
The superficial cervical	9	2	11	Ovoid	Dark or light brown
Axillary	5	4	5	Ovoid, flattened	Gray
Popliteal	7	4	4	Elongate	Light brown
Medial retropharyngeal	35	6	4	Flattened, triangular	Pink or light brown.
Caudal mediastinal	35	21	13	Elongated, triangular	Light brown.
Portal	6	21	4	Ovoid	Pink
Jéjunal	3	2	5	Triangular	Light brown
Medial iliac	7	2	3	Elongated, notched	Light brown

Most lymph nodes are detected in accordance with the above characterization Junqueira (1986), and Saley (1986), either round, randomly shaped, and lymph nodes with sharp limits were also found, as shown in. In the dromedary, we noticed that the lymph node is surrounded by a fibrous capsule, consisting of collagen fiber, reticular fibers and some elastic fibers. Truss extends the fibrous capsule in the lobules and delimits the parenchyma of the node; these fibrous septae increasingly thin towards the center of the body and the support are the blood vessels and nerves Popesco (1962). The color is very variable, (pink, gray, black and pale brown). In the dromedary, the average is 131 lymph nodes divided into 34 groups of 25 and 9 inconstant constant.

On palpation confirmed that the occurrence of lymph node is dented rough to the touch, this consistency is due to its rich fibrous tissue. The fibrous tissue is very abundant not only in the capsule and the number of partitions. This fibrous zone is traversed by numerous blood and lymphatic vessels, an overview has given a clear picture of several regular nodes (mammalian deviation) and juxtaposed together in the same housing (Gui-Fang et al., 2000). The cortex is observable under the capsule with the follicles and germinal centers; but is also observed in the middle of the node, in contact partitions. Each unit shows the usual one node with its cortex and medulla available. Among somatic lymph nodes examined; we have the parotid lymph node; is constant and unique. There is flattened on one side to the other and measure an average of 3 cm in length by 1 cm wide (Figure 1). We have also observed the submandibular lymph node is located in the caudal angle of the mandible laterally to the region of the throat, cervico-facial under the platysma muscle. It is related to the ventral extremity of the parotid gland and responds to the ventral board of the facial vein. It is the surface, on its rear board and omohyoideus muscle, in connection with the sublingual vein; it is between 9 cm in length and 4 cm width (Figure 2).

The cervical lymph node superficial is unique and constant. It is a large oval lymph node and elongated measurement an average of 9 cm long and 2 cm wide. It is located along the cranial edge of the biceps muscle in the space formed by the biceps muscles and omo-transversarius neck. It is covered by the brachiocephalic muscle (Figure 3). As also we found that the axillary lymph node (Figure 4) is always constant, more or less flat almost circular shape. Its dimensions range from 4.5 cm of length to width of 4 cm. He stands up to the 30th ribs on the chest and serratus muscle below the axillary vein. Its deep surface is related to the large round muscle and the thoracodorsal artery.

The popliteal lymph node is unique and constant. It has an ovoid shape. It is located in the popliteal fossa, the gastrocnemius muscles of the leg to the point of greatest convexity of the muscle belly (Figure 5). The popliteal lymph node is, however, almost hidden by the thick elastic blade strengthens the tibial is fascia surface. This blade

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extends from the ischia tuberosity to the calcaneus. The node responds to the dorsal edge of the gastrocnemius muscle and caudal edges of the semitendinosus and biceps femoris, it measures 7cm in length and 4 cm wide.

Figure 1 - Parotid lymph nodes.

Figure 2 - Submandibular lymph nodes.

Figure 3 - Cervical lymph nodes.

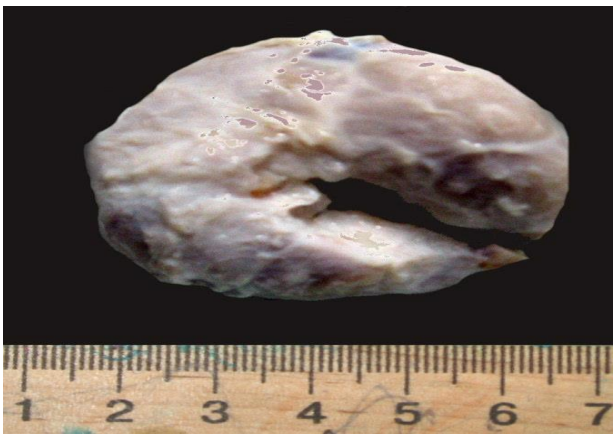

Figure 4 - Axillary lymph nodes.

Figure 5 - Popliteal lymph nodes.

For visceral lymph nodes studied were selected the retro pharyngeal lymph node is a bulky lymph node dug by a gutter which houses the common carotid artery. It is based on the common carotid artery. It is related to the surface with the mandibular gland and dorsally with occipital artery, it is between 7 cm in length and width of 6 cm. caudal mediastinal lymph node is always constant and united. This is an enlarged lymph node measuring 35 cm in length 21cm wide. It has the shape of a curvilinear triangle. It is located far back in the caudal mediastinum after passing through the esophagus into the hiatus. It is placed lateral-dorsally on the esophagus, along the ventral edge of the abdominal aorta and based in part on the central portion fleshy pillars of the diaphragm. This extends the ganglion 10th thoracic vertebrae of the vertebral body to the level of the first lumbar vertebra. The hepatic portal

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lymph node is elongated and has 4 lobes. They are constant and their size varies from 6 cm length 2 cm wide. Own liver lymph nodes are located in the attachment of the lesser omentum in the portal fissure and against the portal vein. They are partly hidden by the pancreas. So the further jejunum lymph node is smaller, located along the spiral colon. They throw themselves into the para-aortic lymph nodes. It measure 3 cm in length and 2 cm wide. The medial iliac lymph nodes are not large. They are irregularly shaped and formed an indentation where the external iliac artery passes. It was noted that it is located in the angle formed by the external iliac and the internal iliac artery. Most of these nodes are based on the small psoas muscle. It measure 6 cm in length and 4 cm in width.

CONCLUSION

Macroscopically, the lymph nodes of the dromedary congregate; they are partially fused, structural-functional units (small units) without evidence of the specific attitude. The architecture is formed of a plurality of aggregates, the latter are surrounded by a connective tissue which covers the entire surface of the lymph node is a cluster and each node lymphatic itself. For after our research can have that lymph node dromedary with its structure is similar to all mammals and specially the pigs.

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PERFORMANCE AND NUTRIENT UTILIZATION OF BROILERS FED MALTED SORGHUM SPROUT (MSP) OR WHEAT-OFFAL BASED DIETS SUPPLEMENTED WITH YEAST CULTURE AND ENZYME

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ABSTRACT*:* An experiment was conducted on a total of two hundred and forty day- old, unsexed Marshal Broiler chickens which were randomly allotted to 8 dietary treatment groups of 30birds each. Each treatment group was replicated 3 times with 10 birds per replicate. The experiment was a 2×4 factorial consisting of two test ingredients (MSP and wheat offal) at 4 levels (0 g kg-1 yeast and enzyme, + 0.01 gkg-1 yeast and enzyme, +0.013 gkg-1 yeast, +0.01 gkg-1 enzyme). At the end of the trial, the effect of MSP and wheat offal with 0.01g/kg-1yeast and those on 0.01 g/kg-1 yeast + 0.01 g/kg-1 enzyme inclusion showed a significant effect (P<0.05) for final live weight, weight gain, feed intake and feed conversion ratio and fibre retention. Broiler starter Chickens fed MSP diets had lower (P<0.05) final live weight, weight gain, feed intake and fibre retention than those fed wheat offal based diets irrespective of the additives. However, finishing broilers fed wheat offal diet supplemented with 0.01 g/kg-1 yeast and those on 0.01 g/kg-1 yeast + 0.01 g/kg-1 enzyme recorded a higher (P<0.05) final live weight, weight gain, protein retention and NDF retention than MSP diets. Conclusively, Inclusion of yeast + Enzyme improved protein retention, fat and fibre digestibility. The combination of yeast and Roxazyme enzyme improved the utilization of wheat offal (w/o) and Malted sorghum sprout (MSP) based diets by broiler chickens. It is therefore recommended that MSP supplementation with yeast + enzyme or enzyme singly could be used to improve Livestock rations for better performance.

Keywords: Nutrition, Performance, Broiler, Malted Sorghum Sprout.

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INTRODUCTION

In livestock production, modern techniques have enhanced rapid productivity within a very short period of time. This makes the development of poultry industry the fastest means of bridging the protein deficiency gap prevailing in developing countries. Consequently, more problems have arisen in the industries. The major problem so far is how to meet up with the nutritional requirements of the birds. Likewise, increase in cost of conventional feedstuff for basal energy and protein in poultry have encouraged inadequate concentrate feeding and low productivity in poultry production. However, high competitive rate of demand for grains especially maize has made it imperative to supplement with other non- conventional feed ingredients such as malted Sorghum Sprouts (MSP). MSP has prospects as a feed resource (Oke et al., 2012; Fafiolu et al., 2006). Nutritional evaluation of MSP showed that it contained 226, 224, 33 and 522g/kg of crude protein, neutral detergent fibre, ether extract and nitrogen free extract, respectively (Aning et al., 1998; Oduguwa et al., 2007). Oke (2012) reported a crude protein, ether extract, ash, NDF, ADF and ADL values of 163.7, 38.2, 62.70, 147, 217, 103 g/kg, respectively for MSP.

Successful utilization of MSP to a limited extent in rats (Oduguwa et al., 2001), dairy cow (Morrison, 1984) and growing pullets (Fafiolu et al., 2006) has been reported in previous studies. However, the nutritional prospect of MSP as feedstuff for poultry is limited due to its tannin content and non-starch polysaccharides (NSP) (Elkin et al., 1995; Fafiolu, 2003; Oduguwa et al., 2001). Inhibitory effects of dietary tannin and arabinoxylan (Balogun et al., 2005) on intestinal digestive enzymes, nutrient digestibility and growth of poultry have been reported. Recent studies have shown that dietary manipulations such as inclusion of certain feed additives could go a long way to ameliorate the negative effects created in erstwhile denigrated feed ingredients. Enzyme supplementation of cereal based diets improved ileal nitrogen, AME, digestion of dietary starch, fibre, protein and lipid in poultry (Bedford and

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Schulze, 1998; Choct et al., 1999). In a similar manner, yeast and its extracts have been reported in literatures to promote growth, improve nutrient digestibility and stimulate birds' immune systems (Abel and Czop, 1992). These beneficial actions recorded following inclusion of yeast have been linked with the β-1,3 or 1,6 glucans structure present in yeast which stimulate immune modulator substances in animals (Abel and Czop, 1992; Parks et al., 2001). This study therefore seeks to evaluate the effect of yeast and enzyme supplementation on the utilization of malted sorghum sprout or wheat offal based diets by broiler chickens.

MATERIAL AND METHODS

Experimental site

The research work was carried out at the poultry unit of the Teaching and Research Farms, Federal University of Agriculture, Abeokuta, Ogun State Nigeria (Latitude7113′ 49.46″N andLongitude3126′11.98″E).

Experimental birds and housing

Two hundred and forty day –old broiler chickens were obtained from a commercial hatchery and reared intensively on deep litter housing system. The birds were divided into 8 groups of 10 birds replicated 3 times and were allocated to 8 experimental diets .The birds were given the experimental diets from day-old and were fed *ad libitum* until mature weight at 8 weeks of age. The commercial enzyme used contained cellulose (EC.3.2.1.4), beta-glucanase (EC.3.2.1.6) and xylanase EC (3.2.1.8) and was added at the rate of 10g/100kg diet and yeast also at 10g/100kg diet.

Experimental design and Dietary treatment

The experiment was a 2 by 4 factorial design made of 2 factors (MSP and WF) and 4 levels (–Y-E, +Y, +E and +Y+E). MSP was used to replace wheat offal (WF) contained (150g/kg) in broiler finisher diet formulated. Eight diets were formulated such that each MSP and WF was supplemented with yeast (+Y), enzyme (+E) or a combination of yeast and enzyme +Y+E) while unsupplemented diet (-Y-E) stands for control. Two hundred and forty (240) day –old broiler chickens were divided into 8 groups of 10 birds replicated 3 times and were allocated to 8 experimental diets .The birds were given the experimental diets from day-old and were fed ad libitum until mature weight at 8 weeks of age. The commercial enzyme used was added at the rate of 10g/100kg diet and yeast also at 10g/100kg diet.

DATA COLLECTION

Growth performance: Feed intake was computed as the difference between the feed offered and leftovers. Gain in weights and feed intake were measured at weekly intervals. Feed to gain ratio was computed as the ratio of feed consumed to weight gain. A record of mortality was kept as it occurred.

Metabolic trial: Metabolic trial was conducted at the 3rd and 7th week of experiments, 2 birds per replicate were randomly selected and housed separately in appropriate metabolic cages fitted with individual feed troughs and facility for separate excreta collection. A two-day acclimatization period was allowed prior to the commencement of 3 days metabolic trial. Known weight of feed (slightly above the respective daily requirements) was fed to the birds housed in individual metabolic cages. Excreta collected per bird per day (for three days) were oven dried (60oC) and used for subsequent laboratory analyses. Proximate composition (AOAC, 1995) of feed and dried excreta samples were analyzed for Crude protein retention and digestibility of dry matter, crude fibre, ether extract, NFE and ash according to standard procedures.

Chemical and statistical analyses: The proximate composition of the diet was determined by the AOAC (1995). The data collected were subjected to analysis of variance using 2×4 factorial in a complete randomized design. The analysis of variance was done according to the procedure of the statistical Analysis System (SAS, 2001).

RESULTS

Table 2 shows the proximate composition of Malted Sorghum Sprout and wheat offal. The dry matter contents of the experimental diets ranged between 91.46 for birds on wheat offal and 91.67 for birds on MSP. The crude protein, ether extract, ash, crude fibre, NDF, ADF and NFE for MSP and w/o diet ranged from 22.73 to 22.96,

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3.57 to 3.59, 5.32 to 5.26, 3.69 to3.97, 37.29 to36.82, 17.12 to 16.53 and 56.07 to 53.86 for starting broilers while NDF, ADF and NFE values ranged between 38.59, 21.28, 58.19 for finisher broilers on MSP diets respectively. Table 3 present the performance characteristics of experimental birds at the two physiological stages of growth. At the starting phase. Birds fed wheat offal supplemented with enzyme (+E) recorded the highest (P<0.05) final weight of 567.73 g/bird while those fed MSP diets with or without supplementation recorded the least value. MSP diet control and those supplemented with yeast were least utilized. The daily weight gain followed a similar pattern as final weight of birds on wheat offal enzyme diets supplemented recorded the highest (P<0.05) value while those on MSP control diet recorded the least value. The daily feed intake was significantly (P<0.05) influenced by the dietary treatments birds fed w/o based diets supplemented with enzyme recorded the highest amount (P<0.05) of feed consumed with the least value in birds fed MSP diet with or without yeast supplementation. The feed conversion ratio (FCR) were highest (P<0.05) at MSP based diet without supplementation and with Yeast supplementation while the least values were recorded for wheat offal diets with or without additives.

Furthermore, wheat offal supplemented with additives recorded the highest cost of feed per kg diet and cost of feed per kg weight gain while MSP supplemented with additives were cheaper although the means were not significant (P>0.05). There was significant difference (P<0.05) on all the growth parameters measured at the finisher phase. Birds fed w/o diet without and with either yeast or Enzyme had a significantly higher final weight, feed intake and daily weight gain while those fed MSP without additives supplementation recorded the least values for all the parameters measured. The FCR was highest in birds fed wheat offal based diets supplemented with Yeast + Enzyme (+Y+E) and Yeast (+Y), followed closely were birds on MSP diets supplemented without enzyme which were statistically similar with wheat offal control diet, while the least value was recorded for birds on MSP diet supplemented with Yeast + Enzyme (+Y+E). Cost of feed per kg diet showed no significant interactive effect although the cost to produce wheat offal supplemented with additives was costlier than MSP irrespective of the additives. The cost of feed per kg weight gain was highest in birds fed wheat offal supplemented diets with yeast and enzyme and enzyme alone with the least cost in birds fed MSP diet control. Table 4 shows the effect of (MSP) and (W/O) with or without enzyme and yeast on nutrient utilization of broiler chickens at the two physiological stages of growth. At starter phase, supplementation with yeast and enzyme +yeast either with wheat offal or MSP significantly improved the digestibility of ash retention, ADF and NFE digestibility. However, protein digestibility, fat digestibility, fibre digestibility and NDF digestibility were not significant (P>0.05). Ash digestibility recorded for birds fed yeast and enzyme supplemented diets had similar (P>0.05) effects for those with wheat offal or MSP. The NFE digestibility ranged from 48.72 in birds fed MSP diet with yeast (+y) to 60.68 in birds Fed MSP diet control (-Y-E). Digestibility of the finishing broilers revealed that CP, Fibre, NDF and NFE were significantly (P<0.05) influenced. Supplementation of wheat offal diet and MSP diet with enzyme and yeast significantly improved the CP of the birds. The values obtained were however higher than birds fed other diets. The result also revealed that birds fed wheat offal diet with +Y+E and those fed MSP diet with +Y had similar values. The interaction effect recorded a statistically similar values for NDF digestibility of birds fed (+Y) and those fed +E. The interactive (P>0.5) effect for NFE digestibility ranged from 48.72 in birds fed MSP diet with yeast (+y) to 60.68 in birds Fed MSP diet control (-Y-E). Fat retention, ash digestibility and ADF digestibility showed no (P > 0.05) significant interactive effect.

DISCUSSION

The crude protein, crude fiber, ether extract values of the MSP determined agreed with the values recorded by Fafiolu et al. (2006). However, the values of ash and NFE in this study were relatively lower than values recorded by Fafiolu et al. (2006). The highest (P<0.05) values of daily weight gain and final weight of birds on wheat offal enzyme diets supplemented recorded than those on MSP control diet suggests the superiority of wheat offal in supporting growth than MSP, this agreed with earlier work of Oso et al. (2013) who reported higher final live weight, weight gain and feed intake when fed wheat as sole cereal to turkeys. The poor performance in birds fed MSP can be attributed to the presence of certain anti-nutritional factors (ANFS) in MSP. MSP is known to contain hydrocyanide (Ikediobi, 1989; Taylor, 1993).

Tannin is another ANFS known to be present in MSP (Aning et al., 1998; Oduguwa et al., 2001). The consumption of these ANFS has been reported to depress net protein utilization and hence animal performances (Aletor, 1998). The daily feed intake was significantly (P<0.05) influenced by the dietary treatments. Birds fed w/o based diets supplemented with enzyme recorded the highest amount (P<0.05) of feed consumed with the least value in birds fed MSP diet with or without yeast supplementation. The significantly lower feed intake in birds fed MSP may be due to the stringent taste of MSP which might have affected the palatability of the diets. Jegede (1999) attributed a low intake of MSP fed to rats to bitter taste. The poor performance of birds fed MSP could be attributed to their low intake which resulted in their poor performance.

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Table 1 - The composition of basal experimental diet at starter phase (g/kg)

	Starter				Finisher			
Levels	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Ingredient	-Y –E	+Y + E	+Y	+E	-Y –E	+Y +E	+Y	+E
Maize	470	470	470	470	540	540	540	540
Wheat offal	-	-	-	-	150	150	150	150
Fish Meal	30	30	30	30	10	10	10	10
MSP	150	150	150	150	-	-	-	-
Soybean meal	160	160	160	160	120	120	120	120
Groundnut cake	146	146	146	146	130	130	130	130
Bone Meal	18	18	18	18	15	15	15	15
Oyster shell	15	15	15	15	2.5	2.5	2.5	2.5
Premix	3	3	3	3	3	3	3	3
Salt	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Lysine	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
Methionine	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5
TOTAL	1000	1000	1000	1000	1000	1000	1000	1000
Determined Analysis								
ME (MJ/Kg)	11.32	11.32	11.32	11.32	11.25	11.25	11.25	11.25
CP (%)	22.73	23.73	23.62	23.28	19.93	19.86	19.56	19.52
EE (%)	3.86	3.68	3.57	3.68	3.89	3.51	3.59	3.81
CF (%)	3.69	3.60	3.48	3.52	4.83	3.68	3.72	3.61
NDF (%)	37.29	35.92	36.07	36.13	40.12	37.36	38.59	38.62
ADF (%)	17.12	15.29	15.31	15.62	21.74	19.46	19.81	21.01
NFE (%)	56.07	54.57	55.30	55.79	57.55	59.39	59.10	58.01

Table 2 - Proximate composition of the test ingredients.

Ingredients	CP	CF	EE	Ash	NDF	ADF	NFE	DM
MSP	22.73	3.69	3.86	5.32	37.20	17.12	56.07	91.67
W/O	22.96	3.97	3.59	5.26	36.87	16.53	53.86	91.46

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Table 3 - Effect of (MSP) and (W/O) with or without enzyme and yeast on performance characteristics of broiler chickens

Starter									
	MSP				W/O				
Measurements	**-Y-E**	**+Y+E**	**+Y**	**+E**	**-Y-E**	**+Y+E**	**+Y**	**+E**	**SEM**
Initial weight (g)	48.37	48.47	48.43	48.21	48.37	48.36	48.23	48.17	0.06
Final weight(g)	338.57^{e}	380.49^{d}	343.09^{e}	399.17^{c}	554.03^{b}	560.17^{b}	556.28^{b}	567.73^{a}	20.70
Daily weight gain (g)	10.36^{e}	11.86^{d}	10.52^{e}	12.53^{c}	18.06^{b}	18.28^{b}	18.14^{b}	18.56^{a}	0.74
Daily feed intake(g)	31.20^{g}	32.28^{e}	31.73^{f}	33.24^{d}	37.93^{c}	39.18^{b}	39.18^{b}	39.90^{a}	0.74
Cost of feed/kg diet (₦)	58.00	58.48	58.08	56.40	67.00	67.48	67.08	67.40	0.74
Cost of feed/kg weight gain (₦)	137.08	131.64	147.34	142.69	135.09	134.49	140.83	128.64	0.95
FCR	3.01^{a}	2.72^{b}	3/02^{a}	2/65^{c}	2/10^{e}	2.16^{d}	2.16^{d}	2.15^{de}	0.08
FINISHER PHASE									
Parameters	+Y	+E	+Y+E	-Y-E	+Y	+E	+Y+E	-Y-E	SEM
Initial weight(g)	462.43	463.43	463.43	463.43	463.43	463.43	463.43	463.43	20.70
Final weight(g)	1076.45^{c}	1141.41^{b}	1128.45^{b}	1016.06^{d}	1252.02^{ab}	1263.44^{ab}	1278.37^{a}	1287.16^{a}	31.80
Daily weight(g)	21.93^{d}	24.25^{c}	23.79^{c}	19.77^{e}	28.16^{b}	28.61^{a}	29.14^{a}	29.45^{a}	0.44
Average feed(g)	49.30^{de}	55.97^{d}	51.24^{e}	44.53^{f}	67.23^{a}	65.55^{b}	59.88^{c}	58.05^{c}	1.17
Cost of feed /kg diet (₦)	52.08	52.40	52.48	52.00	61.08	61.40	61.48	61.00	2.10
Cost of feed /kg weight gain (₦)	131.50^{c}	136.89^{c}	120.19^{d}	120.34^{d}	169.33^{a}	159.62^{b}	168.9^{a}	159.78^{b}	3.17
FCR	2.26^{c}	2.31^{b}	2.17^{d}	2.26^{c}	2.39^{a}	2.29^{bc}	2.28^{bc}	2.30^{b}	0.02

Table 4 - Effect of (MSP) and (W/O) with or without enzyme and yeast on nutrient utilization of broiler chickens

	MSP				W/O				
Measurements	**+Y**	**+E**	**+Y+E**	**-Y-E**	**+Y**	**+E**	**+Y+E**	**-Y-E**	**SEM**
Protein Retention (%)	73.68	72.21	75.10	75.28	.73.96	73.92	75.10	74.66	0.268
Fat	69.93	71.07	76.05	74.80	75.59	76.43	75.56	72.57	0.555
Ash	80.83^{b}	7 8.72^{d}	81.59^{a}	80.54^{b}	80.38^{bc}	79.86^{c}	81.56^{a}	78.08^{e}	0.287
Fibre	72.15	71.16	73.14	74.05	74.47	74.41	75.06	72.55	0.340
NDF	52.05	53.42	57.09	61.84	53.94	60.86	56.07	61.47	1.01
ADF	33.83^{d}	39.03^{d}	45.62^{c}	53.13^{a}	46.26^{bc}	48 .46^{b}	44.00^{c}	45.55	1.18
NFE	48.72^{e}	51.71^{cd}	52.71^{b}	60.68^{a}	54.34^{b}	49.88^{de}	51.77^{cd}	53.31^{bc}	0.940
Finisher phase									
Protein retention (%)	75.73^{a}	74.30^{bc}	74.21^{c}	71.18^{d}	75.15^{ab}	74.58^{bc}	76.03^{a}	69.29^{e}	0.515
Fat	77.54	77.23	77.43	76.82	77.29	76.77	77.21	74.74	0.310
Ash	81.78	81.75	80.38	81.56	82.37	81.37	81.89	89.56	0.224
Fibre	77.97^{ab}	76.52^{cd}	77.23^{bc}	75.78^{d}	78.83^{a}	76.92^{c}	78.84^{a}	68.18^{e}	0.711
NDF	62.91^{a}	61.51^{ab}	58.57^{c}	55.08^{d}	59.41^{bc}	58.72^{c}	60.40^{abc}	52.46^{e}	0.954
ADF	56.49	58.96	58.85	59.55	57.37	62.99	54.49	55.44	0.778
NFE	64.76^{a}	63.27^{ab}	60.25^{cd}	59.39^{d}	60.84^{bcd}	60.45^{cd}	62.40^{abc}	53.62^{e}	0.942

^{abc} Means on the same row having different superscripts are significantly different (P<0.05)

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The values of feed conversion ratio recorded for birds on wheat offal diets with or without additives showed that the diets were better utilized, it agreed with the work of Park et al. (2001). Though birds fed MSP diet with or without Yeast supplementation recorded the worst value.

Furthermore, wheat offal supplemented with additives recorded the highest cost of feed per kg diet and cost of feed per kg weight gain while MSP supplemented with additives were cheaper although the means were not significant (P>0.05). Jegede et al. (2008) confirmed that MSP is a cheap and locally available agro-industrial by product from dried roots and shoots left after extraction of malt from germinated sorghum. Ikediobi (1989) also reported that MSP has prospects as feedstuff in Nigerian livestock industry. Furthermore, supplementation with yeast and enzyme +yeast either with wheat offal or MSP significantly improved the digestibility of ash retention, ADF and NFE digestibility. The increased Ash digestibility recorded suggests that more minerals are available and retained by the birds. The trend observed with MSP diet control could be a reflection of anti- nutritional factors present in MSP whereas the better performance noticed in Yeast based diet is an indication that Yeast is able to breakdown the Acid Detergent fibre whereby making more nutrient available for birds. It agreed with the earlier work of Gurbuz et al. (2011). Saccharomyces cerevisiae yeast cell wall (YCW) components have been used in animal feeding to improve nutrient digestibility (Hooge, 2003; Rosen, 2007). Major structural components of yeast are glucans with -1-3 glycosidic linkages (Griggs and Jacob, 2005). The -1-3 glucans serves as immune modulators and improved poultry immune system (Abel and Czop, 1992), body weight gain and feed conversion (Parks et al., 2001).

However, the increment noticed for the digestibility indices of birds placed on +E and +Y+E is an indication that enzymes supplementation improved the digestibility of the proximate constituents. The findings of Fafiolu (2007) earlier indicated this fact that addition of enzyme led to significant improvement in nutrient, utilization of crude protein, crude fiber, and ash digestibility. Digestibility of the finishing broilers revealed that CP, Fiber, NDF and NFE were significantly (P<0.05) influenced. Supplementation of wheat offal diet and MSP diet with enzyme and yeast significantly improved the CP of finishing broilers. This confirmed the earlier report of Zanella et al. (1999) and also agreed with the findings of Patridge and Wyatt, (1995) who reported that enzyme supplementation improved protein digestibility in broilers. They also stated that the digestibility of amino acids was found to increase by 10% with added enzymes in broilers.

CONCLUSION

It can be concluded that Malted Sorghum Sprouts cannot replaced wheat offal without appropriate supplementation with additives for better performance. However, Malted Sorghum Sprouts supplemented with yeast +enzyme and enzyme singly improved performance characteristics and nutrient digestibility.

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SURVEY OF PROTOZOA PARASITES INFESTATION OF *Synodintis schall* COLLECTED FROM JABEL AWLIA DAM RESERVOIR AT KHARTOUM STATE

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ABSTRACT*:* The main target of the present research to conduct a survey of protozoan parasitic infestation in (Synodontis schall).collected from natural environment, study also aimed to identify the protozoan parasite of high parasitic load. 69 samples of fish were examined, 38 male and 31 female on the region of the label Awlia reservoir in the White Nile represented in (Synodontis schall) which is one of most consumed species in Khartoum state. This study was conducted in Sudan University of Science and Technology College of Animal Production Science and Technology, Department of Fisheries and Wildlife Science in the period from beginning of April to June 2014. The study revealed that the Haemogregarines was most common parasite obtained in this study with high prevalence rate followed by *Trichodina* sp, Chilodenella sp, Ich sp, in skin and gill of the mentioned fish as external protozoa. Indoparasite include Hexamita sp., Myxobolus sp., Cryptobia sp., Ichthyobodo sp., and Hennguya sp. Most found in the blood, gonad, liver and kidney respectively as internal parasite. The finding of this study showed prevalence rate of parasite in fish sample examined from skin and gill has high prevalence rate in male than female of studied fish. Also prevalence rate of parasite from internal organ has high prevalence rate of parasite in male than female of the fish study. All the result was analysis by SPSS version 16 by using t-test and the prevalence and means abundance of parasite represent by tables.

Keywords: Parasites, Protozoa, Prevalence, Synodontis Schall.

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INTRODUCTION

Fish is important to human populace in trade and economy; it is of importance in the diet of different countries especially in the tropics and subtropics where malnutrition is a major problem (Alune and Andrew, 1996; Osuigwe and Obiekezie, 2007). As the human population inevitably increases, the demand for fish as source of protein will grow (Abolarin, 1996). Fish parasites are numerous and many phyla in animal kingdom have representative that are parasitic to fish. There are by far more parasite species that infect fish than any other group of infectious disease (Blazer, 1996). Most fish in the wild are likely to be infested with parasites, but in the great majority of cases, no significant harm to the host may be ensued or identified, thus, there are only few reports of parasites causing mortality or serious damage to the fish populations, but this may be largely because such effects go unnoticed (Roberts, 2001).

The effects of parasites on fish include nutrient devaluation (Hassan et al., 2010); alteration of biology and behavior (Lafferty, 2008); lowering of immune capability, induction of blindness (Echi et al., 2009 a, b); morbidity, mortality, growth and fecundity reduction (Nmor et al., 2004) and mechanical injuries depending on the parasite species and load (Echi et al., 2009 a, b). Fishermen or consumers observe parasites in wild fish only when they are so obvious as to lead to rejection of fish (Roberts, 1995). In culture fish population on the other hand, parasites often cause serious outbreak of diseases (Kayis et al., 2009).

In general protozoa are one of the major sectors of fish parasites that have been long neglected because of its inherent difficulty in studying compared to other larger parasites (Akinsanya and Otubanjo, 2006). The relationship of protozoan to fish may be independent, commensally or parasitic (Roberts, 1995). Parasitic infection and diseases are some of the factors hindering high productivity in fish wild resources and farming (Roberts, 2001). In many instances, individuals of protozoan parasites provoke the secondary infection of other pathogens like

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viruses, fungi and bacteria and are the most dangerous parasitic group that probably causes more diseases in fish cultures than any other type of animal parasites (Akinsanya and Otubanjo, 2006).

The research was conduct to investigate protozoan parasitic infestation in (Synodontis schall) male and female collected from Jabel Awlia dam White Nile River at Khartoum State, study also aimed to identify the protozoan parasite of high parasitic load.

MATERIAL AND METHOD

Study area:

The study was carried out in Jebel Awlia Dam reservoir (JADR) located at 32˚29′07.1″ E and 15˚14′18.1″ N, 40.6 Km2 south of Khartoum; the dam elevation is 383m. It was constructed to control the flow of the Nile to aid the Aswan Dam in storing water for summer cultivation in Egypt.

Source of fish:

A total of 69 sample of (Synodontis schall) were collected from Jabel Awlia reservoir from White Nile River at Khartoum. 38 male and 31 female (each from the wild), comprising of different sizes during the summer season (April/2014 to May/2014) were bought from local fishermen catches by gill and cast net from Jabel Awlia dam in white Nile River. The total weight (g) and standard lengths of each fish were measured in centimeters (cm) using meter ruler. The sex of fish was ascertained by both morphological examination and observation of the presence of testis and ovary by dissection of the fish to expose the gonads.

Method

External examination: External examination of each of the fish for parasites was carried out from the gills and skin, using hand lens. Firstly the fishes were brought out of water and the total lengths were taken. Then a sample was taken from gill and skin with hand lens in clean slide then left to air to dry.

Internal examination: Internal examination of each of the fish for parasites was carried out from the blood, liver, kidney, gonad, spleen.

Blood smear: Firstly the fishes were brought out of water and the total lengths were taken.

The tails was cut with sharp (scissor) to obtain blood from caudal vein or artery with pressure and placed on clean slides and left to air dry.

Spleen, kidney, liver and Gounod: Firstly the fishes were brought out of water and the total lengths were mustered. The smears was taken (by clean slide) from organs and were left to air dry.

Fixation: After all that smears dried methanol was added for 10 minutes.

Staining: One Ml of Gimsa stain was mixed with 9 ML of distilled water after that one drop of the stain was added on the surface of smear for 10 minutes and then left to dry by the air.

Microscope examination: The smears were placed under light microscope (the lens x40 for out content and x100) for the identification of the protozoa parasites.

Statistical analysis

All the result was analysis by SPSS version (16) by using descriptive statistics to determine the percentage and prevalence of parasite represent by tables.

RESULT

The result obtained from this study presented in tables 1, 2, 3, 4, 5 showed that (*Synodintis schall*) fish do not show any significant external lesion or abnormality. The result also revealed *Trichodina* spp, *Ichthyophthirius* spp, *Chilodonella* spp*, Ichthyobodo* spp, *Myxobolus* spp, *Cryptobia* spp, *Hemoggarine* spp, *Henneguya* spp and *Hexamita* sp from mentioned species.

The prevalence rate of the external parasite in skin of male (*Synodintis schall*) 33.33% and Gill 27.53%. Also the prevalence rate of the parasite in skin of female (*Synodintis schall*) 30.43% and Gill 26.08%. The prevalence rate of the internal parasite in blood of male (*Synodintis schall*) 23.19%, Gonad 18.84%, liver 23.19 and kidney 20.29% respectively and the prevalence rate of the internal parasite in blood of female (*Synodintis schall*) 26.08%, Gonad 11.59%, liver 20.28 and kidney 14.49% respectively.

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Table 1 - Percentage and frequency of occurrence of protozoa parasites on*Synodintis schall*.

Synodintis schall	Number of fish examined	Number of fish parasited	Percentage of fish parasited
Male	38	28	73.9
Female	31	20	64.5

Table 2 - Percentage and frequency of occurrence of ectoprotozoa parasites on *Synodintis schall*.

Synodintis schall	Number of parasites on skin	Percentage of parasites on skin	Number of parasites on gill	Percentage of parasites on gill
Male	23	33.33	19	30.43
Female	21	27.53	18	26.08

Table 3 - Percentage and frequency of occurrence of indtoprotozoa parasites on *Synodintis schall*.

Organ	Male		Female	
	Number of parasites	Percentage of parasites	Number of parasites	Percentage of parasites
Blood	16	23.19	18	26.08
Gonads	13	18.84	8	11.59
Liver	16	23.19	14	20.28
Kidney	14	20.09	10	14.49

Table 4 - Ectoprotozoan parasites species found density and prevalence on studied fish.

External protozoa	No.of parasites observed	Percentage of parasites observed
Costia sp	12	17.39
Tricodina sp	10	14.49
Chilodenella sp	8	11.59
Ich sp	2	2.89
Apiosoma sp	0	0

Table 5 - Indoprotozoan parasites species found density and prevalence on studied fish.

Internal protozoa	No.of parasites observed	Percentage of parasites observed
Haemogregarines sp	20	28.98
Myxobolus sp	9	13.04
Cryptobia sp	4	5.79
Hennguya sp	3	4.34
Hexamita sp	1	1.44

DISCUSSION

The result of this study shed a light on (*Synodintis schall*) which consider low price and available fish in wet and dry season. The result of investigation indicated the total number of protozoan parasite count of fresh water fish show variation between the samples which examined from the male and female of (Synoditis schall) collected from Jebal Awlia reservoir.

One fish species *Synodintis schall* (38 samples) male and (31 samples) female collected from Jabel Awlia Dam in Khartoum state were studied for external and internal protozoa parasites. The study revealed that the Haemogregarines was most common parasite obtained in this study. These result is agree with result of Davies and Johnston (2000) who reported that Haemogregarines are apicomplexan protozoa, broadly distributed among vertebrate hosts, including fishes.

Results also revealed that *Trichodina* sp., *Chilodenella* sp., *Ichthyobodo* sp., *Ich* sp., have high infection in fish mentioned in skin and gill. These results agree with Schaperclaus (1991) who said that Trichodinia are mobile ciliates often found on gills, fins and skin of many fish species. *Trichodina* sp., recorded from the present study showed high prevalence and density as external parasite. This result is agreement with Shammat (1989) who detected *Trichodina* sp., in skin and gill mucus with 8% in White Nile River and 12% in the pond from Tilapia sp. Also Paperna (1980) reported that heavily infection with external protozoan: *Trichodina* sp., *Costia* and *Chillodonella* sp., in *Tilapia* sp. collected from dam reservoir at Port Elizabeth at South Africa.

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Finding of this study reveals that *Chillodnella* sp infection has high prevalence. These result is confirm by the result of Das (2003) who reported that *Chilodonellids* are small ciliated protozoans found worldwide as free-living species on both invertebrate and vertebrate hosts.

In case of external protozoa the result obtained from this study showed that *Ich* sp. infection with high prevalence rate. This result is in same line with Schäperclaus (1991) who reported that the causative agent of *Ichthyophthiriasis* or *Ich*, is one of the most important pathogenic parasites of cultured fish. Indoparasite include *Hexamita* sp., *Myxobolus* sp., *Cryptobia* sp., and *Hennguya* sp. Most found in the blood, gonad, liver and kidney respectively as internal parasite in prevalence and density. Also *Hexamita* sp. was encountered in the study which agree with Wakita (2005) who reported that the highest infection rate was seen in spring (81%), followed by summer (72%), autumn (60%) and winter (48%).

Myxobolus sp., *Cryptobia* sp., and *Hennguya* sp obtained from this study with high prevalence respectively in the studied fish. This result is similar to result of Woo and Wehnert (1983) who's suggested that haematozoic species were derived from free-living Pro cryptobia via ecto parasitic species that lived on the body surface of fish, the haematozoic Cryptobia were linked to flagellates that lived in the digestive tract of fish. Both hypotheses agree that the haematozoic and non-haematozoic species are very closely related. Lom and Dykova (2006) recorded that up to now, 2180 *Myxosporean* species assigned to a total of 62 genera have been established. In Africa, approximately 200 species of *Myxosporidia* are known today, affecting freshwater as well as brackish or marine fishes (Abakar-Ousman et al., 2006). Reed et al. 2003, Abakar-Ousman et al. (2006) reported that Henneguya of freshwater fishes In Africa, are represented by 25 species.

The finding of this study showed prevalence rate of parasite in fish sample examined from skin and gill has high prevalence rate in male than female of studied fish. Finally result obtained from this study showed that the prevalence of parasite from internal organ has high prevalence rate of parasite in male than female of the fish study.

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PROFIT ANALYSIS OF TRADITIONAL BEEF CATTLE FARM IN MINAHASA REGENCY, INDONESIA

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ABSTRACT: A traditional beef cattle farm agribusiness needs the development in farmer's way of thinking, from production for family or market need, to production for higher profit, and this could be achieved by adapting the economic principles. The objective of this study was to find out business information for profitable business. This study was carried out on beef cattle farmers group in Kanonang III Village, Kawangkoan District, Minahasa Regency. Results showed that raising 10 beef cattles resulted in the Net Present Value at the DF of 25 % as much as IDR 18,788,330.00, Benefit Cost Ratio (B/C) at the DF of 25 % as much as 1.26, Internal Rate of Return (IRR) as much as 34.21 %, and Break Even Point (BEP) with 6 cattles. It could be concluded that the number of 10 cattles in Kanonang III Village, Kawangkoan District, Minahasa Regency, is suitable for production, with BEP achieved at the raising of 6 beef cattles. Therefore it was recommended that beef cattle farmer in Minahasa Regency should raise more than 6 cattles in order to be able to gain some profit.

Keywords: Profitability, Break Even Point (BEP), Beef Cattle.

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INTRODUCTION

The success or failure of a animal farm business is generally measured as benefit-cost ratio. Thus, profit is one of the major objectives in any farm business. The development of beef cattle farm in North Sulawesi Province has a good opportunity. It could be derived from the report of Agricultural and Animal Husbandary Services of North Sulawesi (2012) that number of beef cattles in North Sulawesi increased from 98,538 individuals in 2010 to 102,698 individuals in 2011. Beef demand in North Sulawesi reached 37,000 tons in 2012, while its production gave only 31,000 tons.

This fact makes the cattle farmers need to raise their production. A commercial business, of course, requires development in their way of thinking from production for family need and local marketing to profit orientation for farmer's household (Sere et al., 1998; Mc Leod et al., 2006: Sarma and Ahmad, 2011; Bart et al., 2010). The orientation is already clear, the implementation of various economic principles to gain big profit. It means that the farmer should direct the farm activities to business-oriented, the farm-based business, such as beef cattle farm business (Obese et al., 2008; Roessali et al., 2011; Salem and Khemiri, 2008; Maina et al., 2012). Kapimbi and Teweldemedhin (2012) also found that 70% of the cattle farmers in North Kunene, Namibia, reared their cattle in order to increase the family income, 27% did for consumption, and 3% did for traditional reason.

The actual condition observed in Kanonang III, Kawangkoan District, Minahasa Regency is the cattle farmers traditionally rear the cows around 3 – 12 individuals per family, and the strain is *Ongole* cow. The farmers leave their cattle grassing on the green field in daytime drive back home to be lashed at night in order for theft prevention. The cattles are not kept in the cowshed, and the food is the field grass and the green around the farmer's house. Nevertheless, there are also farmers who make a group managing the cow farming activities together. The problem is the farming group has not known the financially profitable number of cattles reared and what is the reasonable minimum number to rear. This information will be beneficial for the farmers, particularly to fit the financial support owned to run their cattle farming business.

In this regard, a cattle farmer needs to know one of the analytical tools called profit analysis. The investment plan is pursued from the "cash flow", the ratio of the total sales and the total cost. If the net benefit is positive, the investment plan could be continued, and if the net benefit is negative, the investment plan should be stopped. General profit analysis used is Break Even Point (BEP)", "Profit Rate", "Net Present Value (NPV)", "Benefit Cost Ratio (B/C)", and "Internal rate of Return (IRR)" (Gittinger, 1986).

Profit analysis in this study aimed to know the feasibility of beef cattle farming business in relation with the cattle business, to know how many cattles were the minimum number reared by a farmer for beef cattles in the study site, and to avoid the investment continuity in unprofitable cattle business. The profit analysis could be used as a guide to financial management complemented with important information needed by other parties, such as

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banks or business partnership. This study is also crucial since the cow farmers in the study site have not known yet how many cattles could be reared as a minimum number to reach the break even point (BEP) and whether the cattle business they are running is financially feasible.

MATERIAL AND METHODS

Location

This study was conducted in Kanonang III, Kawangkoan District, Minahasa Regency, North Sulawesi Province. Site determination was selected by "*purposive sampling*" under consideration that Kanonang III is the rearing center of ongole crossbreeding cattles in Kawangkoan District, Minahsa Regency, with 923 cattles in 2013 (Statistics Center Office of North Sulawesi, 2013). Also, Kanonang III is a village guided by Faculty of Animal Husbandary, Sam Ratulangi University, Manado.

Respondents

Respondents were all cattle farmers joining the farmer group "Pelita" who reared more than 4 beef cattles amounting 20 people. The respondents selected were the ongole crossbreeding beef cattle farmers who had had at least 5-year rearing experience and had sold ther cattles.

Data Collection

Data collected were primary and secondary data. The former was obtained using questioneers by interviewing the beef cattle farmers that covered cattle ownership, initial weight of the cattle, number of feed consumed, medicines, marketing, and other costs (tax, permit, and etc.). the latter was gained from Agricultural and Animal Husbandary Services of both North Sulawesi Province and Minahasa Regency, to strengthen the research. Based on the primary data, with mean weight, rearing 10 individuals of beef cattles of 170 kg initial weight was projected. This projection was reviewed by considering various technical factors.

Data Analysis

Data were descriptively analyzed to address the characteristics of the cattle farmer respondents un the study site using graphic and percentage. The profit of the beef cattle business was analyzed as follows:

Income Statement (Cost-Benefit)

Basically, cost-benefit calculation reflects the cash inflow and outflow. Therefore, this comonent covers gains and expenditures/costs. For instance, the cost-benefit calculation of the cattle farm (as an illustration) is as follows (Myer, 1979 and Bowlin et al., 1980):

I Cash Revenue of Cattle Business, covering the cattle and the dirt sales

II Cash Expenditure ("*Variable Cost*"), covering the purchase of cow, the cattle feed, the medicines, the transportation cost, and the labor wages.

III Revenue (gross profit = I – II)

IV Fixed Cost, covering the ownership tax, the cage and equipment depreciation, the loan interest, the insurance, and the salary of the company leader.

V Net Income (III – IV).

Note: The depreciation of cage and equipment was calculated using a straight line method (Emery et al., 1962):

$$\text{Depreciation} = \frac{\text{Initial investment value} - \text{residual value}}{\text{Economic age}}$$

"Break Even Point" (BEP) is a condition indicating the business is neither lost nor profitable (Johannes et al., 1980):

$$\text{BEP} = \frac{\text{Fixed Cost}}{1 - \frac{\text{Total Variable Cost}}{\text{Total Sales}}}$$

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Investment criterion

The test based on "*Investment Criterion"* is intended to know how big is the benefit and cost during the project economic period ("*in the future*"). The value at present (t_0) was measured in Present Value. This used Discounting Factor (Gittinger, 1986) as follows:

Net Present Value (NPV)

$$NPV = \sum_{t=1}^{n} \frac{Bt - Ct}{(1+i)^t}$$

- NPV Positive → the cattle business is continued
- NPV Negative → the cattle business is terminated
- NPV = 0 → no profit or loss (BEP)

Benefit Cost Ratio (B/C)

$$B/C = \frac{\sum_{t=1}^{n} \frac{Bt}{(1+i)^t}}{\sum_{t=1}^{n} \frac{Ct}{(1+i)^t}}$$

Where:

Bt = Benefit in year t
Ct = Cost in year t
I = Interest rate
t = Cattle business age in year t

Decision:

B/C > 1 → Cattle business is feasible
B/C < 1 → Cattle business is not feasible
B/C = 0 → *Break event point*

Internal Rate of Return (IRR)

IRR is an interest rate indicating that Net Present Value equals to number of all cattle project investment costs. In other words, IRR is an interest rate in which entire net cash flow at present equals to Investment Cost. In IRR analysis, the Discount Rate would be determined and the NPV would be set to 0. To determine the ideal discount rate, an interpolation was done between the lower interest (giving negative NPV) following the formula below (Gittinger, 1986):

$$IRR = DfP + \frac{PVP}{PVP - PVN} X \quad (DfN - DfP)$$

where:

DfP = "*Discounting Factor*" used, giving positive Present Value.
Dfn = "*Discounting Factor*" used, giving negative present value.
PVP = "*Present Value*" positive
PVN = "*Present Value*" negative

RESULTS AND DISCUSSION

Respondent's characteristics

Results showed that average area occupied by the cattle farmer's household in the study site was 0.92 ha, but the area worked was only 0.74 ha, because the rest was employed to graze the cattles, and thus, the farmer

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left the field to grow grasses, and the cattle could take advantages of the grass and the agricultural wastes in the farming area.

Table 1 - Respondent's Characteristics

Variable	Category	Percent	Average
Land Size (hectare)	-	-	0.92
Age	Productive age	93	2.73
	Unproductive age	7	0.69
Educational Level	No Education	0	-
	Elementary	18	-
	Secondary	35	-
	High School	38	-
	University	9	-
Number of Households (person)	-	-	3.86
Experience Level	< 5 years	24	-
	5 – 10 Years	42	-
	> 10 Years	34	-

The cattle farmers belonging to the productive age were 93 farmers (93%) and the rest 7 farmers (7%) belonged to the unproductive age. This condition indicates that most farmers belong to the productive agers, and therefore, they are assume to be capable of managing their cattle business and relatively fast adopting the technology. In education, all cattle farmers have had formal education, even though some of them do not finish the elementary school. They are 38% with high school, 18% with elementary school, 35% with secondary school, and 9% with university education. Beside formal education, the cattle farmers in the study site has also non-formal education, such as counseling from the agricultural and animal husbandary extension workers of Kawangkoan district, so that their long cattle farming experience and sufficient cattle business knowledge, the farmers will ease them to catch the new technology and implement it. Number of family members ranged between 2 to 7 people with an average of 3.86 people. This potential of number of family members is utilized for family business activities, such as food plant farm (rice, corn, peanut etc.), cattle farm business, *off farm (*agricultural labor, cow sales, crop sales), and working outside the agricultural sector, such as construction labor, running a shop and others. Cattle farming experience reflects that more than 50% of the farmers in the study site possess more than 10 year-experience. Five percents of the farmers have less than 10 year-experience, 45% of them have farming experience of 10 – 10 years, and 50% of the farmers have more than 20 year-experience, so it is apparent that most of them have had good farming experience. The work-cattle long reared is one of the household's income source and savings. The cattle farming business has been carried out since Minahasa Regency was established, about 400 years ago, and done hereditarily up to now combined with other farming activities, such as food plant farming.

Break Event Point (BEP)

BEP is a condition indicating whether the business is neither profitable nor lost. Based on the analysis, the BEP of beef cattle business in Kanonang III was reached at 6 individuals with a value of IDR 32,125,480.14, meaning that the beef cattle business would get profit if the farmer reared more than 6 cattles.

Net Present Value (NPV)

This study showed that rearing 10 beef cattles in Petang village obtained NPV DF 25 % as much as IDR 18,788,330.00, meaning that the beef cattle business was profitable and could be continued.

Benefit Cost Ratio (B/C)

The analysis found B/C, at the discount rate of 30 %, was 1,26. It reflects that at the discount rate of 25 % (high enough), the B/C ratio was still bigger than 1. This condition indicates that the beef cattle business with 10 individuals in Kanonang III is highly beneficial and feasible to run.

Internal Rate of Return (IRR)

Based on the data directly collected from the beef cattle farmers in Kanonang III, it was found the IRR of 34.21 %, reflecting that "Returns to Capital Invested" in 5 farming cycles of 10 beef cattles is highly feasible since the bank interest rate is lower than 34.21 %

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CONCLUSION

This study concluded that rearing 10 beef cattles in Kanonang III, Kawangkoan District, Minahasa Regency was highly profitable so that it was feasible to do. The Break Event Point (BEP) was achieved at the maintenance of 6 cattles.

Recommendation

Based on the financial analysis, the beef cattle farmer should raise more than 6 cattles in order to be able to gain some profit.

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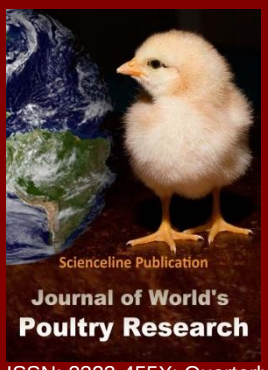

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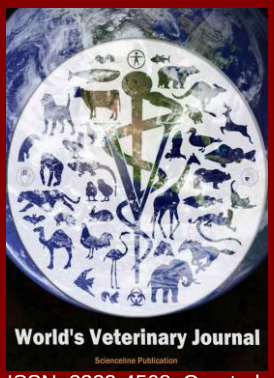

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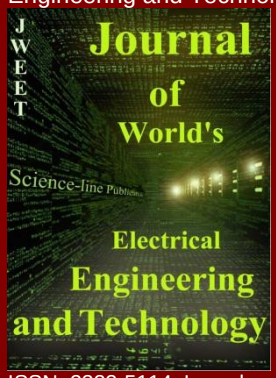

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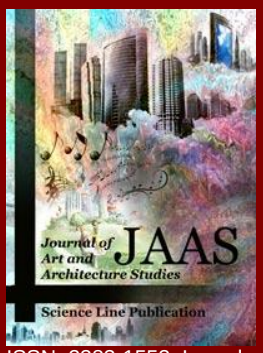

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