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Physical Characteristics and Chemical Composition of Meat from Sheep Fed With Fermented Straw

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ABSTRACT: The experiment was conducted to evaluate chemical composition and physical characteristics of LD and BF of sheep which was fed using fermented rice straw. Fifteen male sheep, approximately 6-8 month old were used in this experiment. They were divided into 5 groups i.e., group A, B, C, D and E. Basal ration (BR) consisted of manure, rice bran, dry cassava powder and rice straw was prepared. Basal ration was fermented using inoculum from ruminal fluid of Ongole cross bred cattle for 2 weeks. Fermented basal ration (FBR) was wind-dried until it had dryness similar to BR. The sheep of group A, B, C, D and E was then fed using 100% BR : 0% FBR, 75% BR : 25% FBR, 50% BR : 50% FBR, 25% BR : 74% FBR and 0% BR : 100% FBR. They were undergone feed treatment for ten weeks. Afterward 2 sheep from each group were taken for slaughter. Muscles samples especially LD and BF were taken for analysis. Chemical analysis consisted of moisture, protein, fat and cholesterol content whereas CL, WHC and pH were for physical analysis. The data obtained was analyzed statistically using factorial design 2x5. Results of the experiment indicated that chemical composition of sheep meat i.e. protein, fat and cholesterol contents as well as physical characteristics was not influenced by the treatment, except moisture content and pH. Statistical analysis showed that there was not different significantly between LD and ST muscles on whether chemical composition or physical characteristics.

Key Words: Sheep, Chemical Composition, Physical Characteristic, Fermented Straw, Muscles,

Introduction

There is abundant agricultural waste which can be used for animal feed especially rice straw. Rice straw has been used for animal feed in Indonesia for a long time. However, the quality of rice straw such as chemical composition and its digestibility is very low. Many ways have been carried out to improve the quality of rice straw such as ammoniation, making silage and so on. Another alternative in improving the quality of rice straw is by fermentation, using various microorganisms as inoculan.

Microbial protein can be produced from agricultural waste by saccarification process and fermentation process simultaneously and continuously. Feliu et al, (1970) stated that continued fermentation with dilution rate of 0.13 gram/hour was able to produce approximately 0.61 gram biomass per gram of Xylan and 0.74 gram/hour.

Study of Reddy and Erdman (1977) have successfully utilized fermented dung of beef cattle farming for source of additional protein in the ration. Furthermore, they mentioned that fermentation process using additional agricultural waste high in carbohydrate was able to produce feedstuff which had crude protein content 20% or more.

Manure still contained about 18% - 40% of crude protein. According to Muller (1980), 37% to 44% of those percentage consisted of true protein.

Manure can be used in fermentation of rice straw as nitrogen sources. Bachrudin (1993) said that solid state fermentation could improve rice straw digestibility by 30%. Manure of chicken will be used as nitrogen source to be converted to microbial protein. Therefore, in this study fermented rice straw using manure of chicken would be applied to the male sheep.

According to Lawrie (1979) nutrition will influence chemical composition and quality of meat, so that, it is also nccecessary to study the utilization

of fermented rice straw and its influence on chemical composition and physical characteristics of sheep meat.

Material and Methods

Twenty male (6-8 months old) sheep were used in this experiment. They were randomly divided into five groups (K1, K2, K3, K4 and K5) according to the treatment applied. They were fed with different level percentages of fermented ration.

Ration of sheep were prepared and they consisted of chicken manure, rice bran, cassava powder, rice straw. The percentages of each item were 30%, 25%, 25% and 20%, respectively. The basal ration was fermented using manure fluid consisted of CaCO3 (3.5%), TSP (1.5%) and Ziolit (2.5%). Inoculum was derived from rumen fluid of Ongole- cross breed cattle. 5% rumen fluid of total substract was used for fermentation. Fermentation was carried out for 2 weeks. Afterthat, fermented basal ration (FBR) was wind- dried until its dryness was similar to basal ration (BR) .

Before the trial conducted, the sheep underwent pre-experiment for 10 days. The sheep was then fed using basal ration (fermented and/or unfermented) according to the groups. The treatments of ration were as follows: (K1) was fed 100% BR, K2 was fed 75% BR and 25% FBR, K3 was fed 50% BR and 50% FBR, K4 was fed 25% BR and 75% FBR and K5 was fed 100% FBR

Sheep were kept under feeding treatment for 10 weeks. They were weighed once in two weeks to know the growth of animals. After 10 weeks, two sheep from each group were taken for slaughter. Carcass weight were calculated. Sampling of meat from different part of carcass were carried out especially for LD, ST and BF muscles. The muscle samples were analysed chemically to find out the moisture (gravimetri method), protein (Kjeldahl method). fat (soxhlet method), and cholesterol (Lohman Burchard method) contents, whereas physical analyses were conducted to measure their pH, cooking loss (CL)(Soeparno, 1992) and water-holding capacity (WHC)(Bouton method). The data obtained were analysed using varians analysis of factorial design (5x3).

Results and Discussion

Physical characteristics of sheep meat

Physical characteristics of sheep meat which consisted of pH, CL and WHC were presented in Table 1 and 2. Table 1 showed the effect of fermented basal ration on the physical characteristics of meat, whereas Table 5 presented the physical characteristics of sheep meat from various muscles.

Level of fermented basal ration influenced pH of meat (P<0,01). Sheep which was fed 100 % FBR had the highest pH i.e. 7,12 (Table 1). Result of this experiment was in agreement with Lawrie (1979) which stated that pH of meat was influenced by feed. According to Marsh and Thompson (1958) cited by Soeparno (1992) pH of sheep meat was 6,95, so that result of this experiment was slightly higher than that figure, this was probably due to using of fermented basal ration in the experiment. However, using 75 % of FBR or below did not affect pH of meat.

Result of statistical analyses showed that fermented basal ration did not influenced CL and WHC of sheep meat. However, there was a tendency that the higher the percentage of FBR used in ration for sheep the higher the value of CL. The highest value of CL was 41.49 % which was derived from sheep fed 100 % FBR. On the other hand, WHC of meat from sheep fed 100 % FBR had the lowest value, the figure was 13.47 %.

Result of the experiment showed that type of muscles did not influenced pH, CL and WHC of sheep meat. Suharjono et al (1990) stated that Cl and WHC was influenced more by sex rather than location of muscles and level of energy. Location of muscles would determine type of muscles, so that in this study, in fact, type of muscles i.e. LD (muscle from dorsal part) and ST and BF (muscle of leg) resulted similar values of physical property of meat. Furthermore Suharjono et al (1990) mentioned that location of meat (type of muscles) would influenced more on the tenderness of muscle.

There was not an interaction between levels of fermented basal ration and type of muscles on physical characteristics of sheep meat.

Chemical composition of sheep meat

Moisture, protein, fat and cholesterol contents of meat derived from of sheep fed different treatment fermented rice straw ration were presented in Table 3 and 4. Results of statistical analysis showed that meat of sheep using 50% FBR had higher moisture content than other treatements i.e. 79.30%, The lowest moisture content of meat was found on meat from sheep which fed without FBR. According to Lawrie (1979), meat had moisture content

Table 1. The effect of fermented basal ration level on the physical property of sheep meat

Physical property	Levels of FBR					Signification
	0	25	50	75	100	
pH	6.50a	6.55a	6.45a	6.42a	7.12b	**
CL%	34.08	35.01	36.46	38.99	41.49	ns
WHC %	15.61	19.43	14.97	17.65	13.47	ns

a, b superscript in the same row indicated significant different at P < 0,01)
ns not significant

Table 2. The effect of type of muscles on the physical property of sheep meat

Physical property	LD	ST	BF	Significations
pH	6.51	6.69	6.62	ns
CL%	35.55	37.81	38.26	ns
WHC%	16.50	17.18	14.99	ns

ns not significant

Table 3. The effect of fermented basal ration on chemical composition of sheep meat

Constituent	Levels of FBR					Signification
	0	25	50	75	100	
Water (%)	76.72[a]	76.84[a]	79.70[b]	76.89[a]	78.94[a]	**
Protein (%)	19.66	19.21	17.84	17.84	16.87	ns
Fat (%)	2.31	2.79	1.81	2.64	1.73	ns
Cholesterol[1)]	56.93	63.50	59.56	65.54	84.71	ns

a, b superscript in the same row indicated significant different at P < 0,01)
ns not significant
1) mg/100 g meat

Table 4. The effect of type of muscles on chemical composition of sheep meat

Constituent	LD	BF	Significations
Moisture (%)	77.78	77.74	ns
Protein (%)	18.48	18.08	ns
Fat (%)	2.30	2.20	ns
Cholesterol [1)]	63.23	68.01	ns

ns not significant
1) mg/100 g meat

approximately 70% to 80%, therefore results of the experiment was still at that range. Moisture content of meat from sheep fed 20% FBR was not different with meat from sheep fed 75% FBR.

The fermented rice straw did not affect meat protein content as well as its fat and cholesterol content. Forrest et al. (1975) stated that there were many factors which influenced chemical composition of meat such as species, breed, sex, feed and animal ages, however, results of this experiment showed that levels of fermented basal ration did not affect chemical composition of sheep meat except its moisture.

Chemical composition of muscles (LD and BF) of sheep were presented in Table 4. Results of statistical analyses showed that moisture, protein, fat and cholesterol content of LD muscle did not differ with BF muscle. This results was not in agreement with Soeparno (1992) which stated that ration of muscles affected chemical composition of muscles. Although chemical composition of LD and BF muscles did not different, protein, fat and cholesterol of LD muscles tended to be higher than BF muscles.

Conclusion

Level of fermented rice straw in sheep ration did not influence chemical composition of meat, especially protein, fat and cholesterol contents. WHC and CL of meat was not affected by level of fermented rice straw in sheep ration except on pH. Chemical composition and physical characteristics was not influenced by type of muscles.

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