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CONTENTS

ORAL PRESENTATION

Carcass and Meat Yield of Local Lambs Fed Rations Containing Different Proportions of Grass, Legume Trees and Concentrate

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ABSTRACT

Local lambs are usually raised semi-intensively on forage based diet. The aim of this study was to compare carcass and meat yield of local lambs given rations containing different proportions of grass (*Brachiaria humidicola*), legume mixture (*Leucaena leucocephala* and *Gliricidia sepium*) and concentrate during a four months experimental period. Twenty males of six month old thin-tailed lambs with live weight range of 11 – 16.6 kg were used in this study. They were allotted to five different ration treatments; those were lambs kept in cage and given 90% grass and 10% concentrate (R1), 70% grass and 30% legume mixture (R2), grazing lambs on *Brachiaria humidicola* pasture (R3), grazing lambs with 30% mixture supplementation (R4) and grazing lambs with 10% concentrate supplementation (R5). The observed parameters included slaughter weight, carcass weight and percentage, loin eye area, kidney-pelvic and heart fat weight, carcass component weight and percentage, and meat weight distribution within wholesale cut. The results showed that there were significant ($P<0.05$) between treatment differences in slaughter and carcass weights, and therefore carcass composition. The grazing lambs with 30% mixture supplementation (R4) yielded more meat within wholesale cuts as they had heavier slaughter and carcass weights and carcass muscle. In conclusion, the local lambs grazing on *Brachiaria humidicola* pasture with 30% legume mixture supplementation gave the best result in terms of slaughter weight, carcass weight and meat yield within wholesale cuts.

Key Words: Lamb, Grass, Legume, Concentrate, Yield

INTRODUCTION

The population of local lambs in Indonesia is recorded at 13.4 billion heads and mainly concentrated in Java Island (93.4%) with 61.5% being kept in West Java, 18.1% in Central Java and 8.1% in East Java. Lamb meat production recorded in 2012 was 44.4 thousand ton, representing 5 % of total red meat production (DGLAH, 2013). Local lambs generally have low productivity as they are kept intensively or extensively on forage based diet (Duldjaman, 2004; Sodiq, 2010). This study was aimed to compare carcass and meat yield of local lamb given ration containing different proportions of grass (*Brachiaria humidicola*), legume mixture (*Leucaena leucocephala* and *Gliricidia sepium*) and concentrate.

MATERIALS AND METHODS

Animals and Rearing Procedures: Twenty males of six month old thin-tailed lambs with initial live weight ranging from 11 – 16.6 kg were used in this study. They were alloted to five different feeding treatments; those were lambs raised in cage and given 90% grass and 10% concentrate (R1), 70% grass and 30% legume mixture (R2), grazing lambs on *Brachiaria humidicola* pasture (R3), grazing lambs with 30% mixture supplementation (R4) and grazing lambs with 10% concentrate supplementation (R5). The animals were kept for four months in a farm at Jonggol Animal Research and Teaching Unit (JASTRU) Bogor Agricultural University, West Java.

Slaughtering Procedures and Measurements: The animals were fasted but access to water for 16 hours prior to slaughter in order to obtain slaughtered weight. Slaughtering process was carried out according to standard halal method at a slaughter house plant owned by Small

Ruminant Laboratory, Animal Production and Technology Department, Bogor Agricultural University. Carcass dressing was conducted according to Baihaqi and Herman (2012). Following dressing, hot carcass was weighed and then chilled at 4^0 C for 24 hours. The chilled carcass was weighed and divided into two sides along vertebral column. Carcass dissection was carried out on the left side. The left side was broken down into seven wholesale cuts, namely shoulder, breast, shank, rack, loin, flank and leg (BSN, 2008). Each wholesale cut was further broken down into meat, waste fat and bone and these products were then anatomically dissected into muscle, fat and bone.

Statistical Analyses: The observed parameters included slaughter weight, carcass weight and percentage, loin eye area at the 12th rib, kidney-pelvic and heart fat weight, carcass component weight and percentage, and meat weight distribution within wholesale cut. The effects of feeding treatments on the observed parameters were analyzed using analysis of covariance with initial live weight used as co-variable (Kaps and Lamberson, 2004).

RESULTS

The effect of feeding treatments on slaughtered weight and carcass characteristics were presented in Table 1. Slaughter and carcass weights, and loin eye area of the twelfth rib were significantly ($p<0.05$) influenced by feeding treatments. The grazing lambs on *Brachiaria humidicola* pasture with 30% legume mixture supplementation (*Leucaena leucocephala* and *Gliricidia sepium*) produced significantly higher ($p<0.05$) slaughter and carcass weights, and loin aye area of the twelfth rib than those raised in cage and given 90% grass and 10% concentrate or 70% grass and 30% legume mixture. However, the feeding treatments did not have a marked effect on the quantity of kidney, pelvic and heart fats and carcass percentage.

Table1. Slaughter weight and carcass characteristics[§] of thin-tailed lamb raised on different feeding treatments

Carcass Characteristic	Feeding Treatment ($\bar{x}$ ± SE)				
	R1	R2	R3	R4	R5
Slaughter weight (kg)	16.012±0.947^b	15.870±0.933^b	17.490±1.081^{ab}	19.969±0.935^a	17.707±1.091^{ab}
Carcass weight (kg)	5.471±0.418^b	5.411±0.412^b	6.441±0.477^{ab}	7.779±0.412^a	6.666±0.481^{ab}
Carcass percentage (%)	34.73±2.09	34.20±2.06	36.97±2.38	38.94±2.06	37.55±2.41
LEA12 (cm^2)	4.53±0.91^b	5.50±0.89^{ab}	5.39±1.04^{ab}	7.92±0.90^a	6.13±1.05^{ab}
KPHF weight (g)	169.5±19.8	157.3±19.5	136.9±22.6	168.0±19.6	153.1±22.8

§ adjusted to the overall mean of initial liveweight of 14.211 kg; LEA12: loin eye area of the 12th rib; KPHF kidney, pelvic and heart fats; R1: lambs raised in cage and given 90% grass and 10% concentrate; R2: lambs raised in cage and given 70% grass and 30% legume mixture; R3: grazing lamb on *Brachiaria humidicola* pasture; R4: grazing lamb on *Brachiaria humidicola* pasture with 30% legume mixture supplementation; R5: grazing lamb on *Brachiaria humidicola* pasture with 10% concentrate supplementation; Values with different superscripts at the same raw differ significantly ($p<0.05$)

Lamb carcass components consist of mainly muscle, fat and bone. As shown in Table2, on a weight basis significant ($p<0.05$) between feeding treatment differences occurred in carcass muscle and bone but not in carcass fat. The grazing lambs on *Brachiaria humidicola* pasture with 30% legume mixture supplementation produced carcass with significantly ($p<0.05$) more carcass muscle and bone than those kept in the cages given 90% grass and 10% concentrate or 70% grass and 30% legume mixture, and grazing lambs without supplementation. On a percentage basis, the grazing lambs on *Brachiaria humidicola* pasture with 30% legume mixture supplementation had significantly ($p<0.05$) higher muscle content than those raised in the cages given 90% grass and 10% concentrate or 70% grass and 30% legume mixture. Meanwhile, the lambs kept in the cages and given 70% grass and 30% legume mixture had significantly ($p<0.05$) higher carcass fat content than the grazing lambs with or without concentrate supplementation (Table 2).

Table 2. Weight and percentage of carcass component[§] of thin-tailed lamb raised on different feeding treatments

Carcass component	Feeding Treatment ($\bar{x}$ ± SE)				
	R1	R2	R3	R4	R5
Weight (g)					
Muscle	1583.53±129.54^{bc}	1438.82±127.72^{c}	1763.65±147.89^{bc}	2305.52±127.86^{a}	1975.35±149.33^{ab}
Fat	225.99±37.36	285.18±36.84	233.44±42.66	318.67±36.88	243.69±43.07
Bone	805.22±56.35^{bc}	706.08±55.55^{c}	834.95±64.33^{bc}	1029.35±55.62^{a}	911.23±64.95^{ab}
Percentage (%)					
Muscle	58.28±1.27^{b}	58.79±1.25^{b}	61.46±1.45^{ab}	62.83±1.25^{a}	62.39±1.46^{ab}
Fat	8.25±1.05^{b}	11.60±1.04^{a}	8.08±1.20^{b}	8.50±1.04^{ab}	7.33±1.21^{b}
Bone	29.63±1.39	28.83±1.37	29.53±1.59	28.16±1.38	29.87±1.61

§ adjusted to the overall mean of initial liveweight of 14.211 kg; R1: lambs raised in cage and given 90% grass and 10% concentrate; R2: lambs raised in cage and given 70% grass and 30% legume mixture; R3: grazing lamb on *Brachiaria humidicola* pasture; R4: grazing lamb on *Brachiaria humidicola* pasture with 30% legume mixture supplementation; R5: grazing lamb on *Brachiaria humidicola* pasture with 10% concentrate supplementation; Values with different superscripts at the same raw differ significantly ($p<0.05$)

The influence of feeding treatments on meat weight distribution within wholesale cut is summarized in Table 3. Significant between feeding treatment differences in meat weight occurred in all wholesale cuts.

Table 3. Meat weight (gram) within wholesale cut[§] from carcass of thin-tailed lamb raised on different feeding treatments

Wholesale cut	Feeding Treatment ($\bar{x}$ ± SE)				
	R1	R2	R3	R4	R5
Shoulder	404.38±38.28^{b}	362.97±37.75^{b}	464.24±43.71^{ab}	558.38±37.79^{a}	538.01±44.13^{a}
Breast	123.06±16.42^{b}	101.19±16.18^{b}	139.54±18.74^{ab}	177.44±16.20^{a}	143.07±18.92^{ab}
Shank	143.53±14.21^{b}	143.44±14.01^{b}	168.41±16.23^{b}	241.87±14.03^{a}	162.28±16.38^{b}
Rack	100.87±16.75^{ab}	78.62±16.51^{b}	105.72±19.12^{ab}	143.37±16.53^{a}	138.27±19.31^{a}
Loin	115.40±13.39^{b}	100.53±13.20^{b}	131.36±15.28^{ab}	171.10±13.21^{a}	142.81±15.43^{ab}
Flank	85.68±11.09^{b}	86.59±10.93^{b}	99.02±12.66^{ab}	129.86±10.94^{a}	104.88±12.78^{ab}
Leg	610.62±47.45^{bc}	565.48±46.78^{c}	655.36±54.17^{bc}	883.49±46.84^{a}	746.05±54.70^{ab}

§ adjusted to the overall mean of initial liveweight of 14.211 kg; R1: lambs raised in cage and given 90% grass and 10% concentrate; R2: lambs raised in cage and given 70% grass and 30% legume mixture ; R3: grazing lamb on *Brachiaria humidicola* pasture; R4: grazing lamb on *Brachiaria humidicola* pasture with 30% legume mixture supplementation; R5: grazing lamb on *Brachiaria humidicola* pasture with 10% concentrate supplementation; Values with different superscripts at the same raw differ significantly ($p<0.05$)

In most cases, the grazing lambs on *Brachiaria humidicola* pasture with 30% legume mixture supplementation yielded significantly ($P<0.05$) more meat within wholesale cuts compared to those raised in the cages given 90% grass and 10% concentrate or 70% grass and 30% legume mixture.

DISCUSSION

The local lambs at JASTRU farm have long been naturally adapted to dry and hot climate under grazing management and their performance could decrease in the dry season. Under this condition, feed supplementation could improve the productivity of the grazing lambs (Carrasco et al., 2009). They reported that grazing lambs supplemented with concentrate *ad libitum* obviously increased growth rates, slaughter weight and carcass weight and fatness. In this study, the grazing lamb with 30% legume mixture supplementation gave the best result in term of slaughter and carcass weights compared to those kept in the cages either given 90% grass and 10% concentrate or given 70% grass and 30% legume mixture. Consequently, the heavier carcass of the grazing lambs with legume mixture supplementation resulted in heavier carcass muscle and bone. Ramírez-Retamal et al.(2013) reported that at simillar carcass