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INFLUENCE OF FEEDING *PANICUM MOMBASA* AND ALFALFA GRASS ON CARCASS TRAITS OF ARABI LAMBS

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ABSTRACT

To study the effect of feeding two different types of green fodder (Panicum or Alfalfa) on carcass characteristics after a period of ninety days of fattening, twenty-four Arabi lambs were used and divided into three groups: the first group (control) was fed a standard ration with an outing to grazing. The second and third groups reared on the standard ration with Panicum or Alfalfa, respectively. It was found from the results of the statistical analysis of the study data that there was a significant superiority between the two groups of Alfalfa and Panicum (P≤0.05) in live body weight, hot and cold carcass weights, and the percentage of weight at slaughter and the empty weight compared to the control group. While the weight of the tail fat decreased significantly in the Panicum group lambs carcasses compared to the control groups, a significant decrease (P≤0.05) was recorded in abdominal fat and a significant increase in the rib eye area of the Panicum group. While the muscle weight was significantly increased when performing a physical dissection of the three ribs of lamb carcasses fed on Panicum. In general, the two groups of Alfalfa and Panicum excelled in most carcass characteristics, and the lambs of the Panicum group recorded the best carcass traits..

INTRODUCTION

One of the fundamental pillars on which any nation's economy is built is agriculture, both plant- and animal-based parts. Because animal products contain animal protein, which is crucial for human health and safety as well as for human activity, vitality, growth, and the development of the body and intelligence, they are also the world's capital, a major source of labor, and the exploitation of the earth's wealth. In the Arab world, animal farming accounts for 20–30% of the agricultural economy, and the numerous products it produces are the primary source of animal protein, one of the essential nutrients for human nutrition. (Al-Jorani *et al.*, 2020). These factors compelled researchers to adopt various techniques to boost the amount of concentrated feed and roughage fed to animals while decreasing the use of expensive concentrated feeds (Aldoori *et al.*, 2015; Aldoori *et al.*, 2016; and Al-Rubeii *et al.*, 2014), support livestock production, and increase the amount of concentrated feed produced in Iraq through a system of agricultural cycles. In order for rural communities in Iraq to have enough access to food, small ruminants are crucial. The most important farm animals are regarded as being sheep, which have a population of 13,025 million. The sale of lamb accounts for the majority of agricultural income. Because

they require less investment, have shorter production cycles, mature more quickly, and are more ecologically adapted, small farmers prefer little ruminants to larger ones (Hashem *et al.*, 2013). One of the three most important indigenous sheep breeds in Iraq, accounting for about 20% of total output, is the Karadi sheep breed (Alkass, and Juma, 2005).

With the scientific name *Panicum maximum* and the familiar name Guinea grass, Panicum is a plant belonging to the Poaceae family. Each plant is a perennial (Muir and Jank,2004; Pedreira and Lara, 2015). It can grow well in tropical and subtropical climes all over the world and is drought-resistant thanks to its extensive root system. The three-meter-tall Panicum is known for its exceptional production of high-quality leaves and resistance to high temperatures (37–40°C) (Muir *et al.*, 2001). Additionally, Panicum is more productive than alfalfa and can withstand high soil and water salinities for up to ten years (Hare *et al.*, 2014). The cultivation and enhancement of improved cultivars, which have caught the interest of researchers, is one strategy for increasing feed availability.

These types stand out for their strong forage production, quick growth, and regenerative capacity (Akash and Saoub, 2004). The productivity of Panicum reach to 10 ton of dry matter per hectare and the protein content about 16% of dry matter, this ratio of protein had a role in increase protein intake and enhance animal growth and milk yield (Fernandes *et al.*, 2015). Eyoh *et al*, 2019 claim that the Panicum Mombasa plant's chemical composition differs depending on whether it is used to make hay, silage, or green drippings for animal feed. Al-Jorani *et al*, 2020, found that growing *Panicum Mombasa* grass greatly boosted the daily gain and feed, overall weight gains, and feed conversion ratio of local crossbred goats. In addition, Fannos 2020 study, on 20 Awassi lambs showed that when Turkish Awassi lambs were fed Panicum Mombasa grass instead of alfalfa grass, neither their final body weight nor their daily growth were affected. The current study sought to determine how Panicum and Alfalfa impacted Arabi lamb's performance.

MATERIALS AND METHODS

Experiment Location

The current experiment was located at the Animal Farm, Department of Animal Resources, College of Agriculture Engineering Sciences, University of Salahadin, at the period 6th March to 6th June, 2022.

Animals and Experimental design

A total of twenty-four Arabi male lambs (4 months old), with an initial body weight 26.66±0.26 kg, were obtained from the local market and used in the study. After an adaptation period of 10 days, randomly divided equally into three groups (8 lambs per group) to receive 3.5% concentrate of their body weight, the first group was control were fed on pasture, while the second and third groups were fed 3 kg/day of roughage feed (alfalfa and Panicum hay, respectively). Each group of lambs was kept in a separate pen and fed on a group basis.

Management and Feeding

Following a ten-day adaptation period, the lambs in the three groups received the same concentrate diet for the first two weeks of the trial at a rate of 500 g/lamb/day, and then the diet was gradually increased with *ad libitum* feeding (Table 1). Two times a day, at 8:00 a.m. and 16:00 p.m., the diet was made available. Mineral blocks and clean water were always available. Table 2 explains the chemical composition of alfalfa hay, Panicum hay, and a concentrated diet.

Table 1. Percentages of nutrients included in the concentrated diet.

Nutrients	%
Black barley	31
Wheat bran	24
Corn seeds	13
Soybean meal	8
Sunflower meal seeds	5
Wheat flour	16
Sodium bicarbonate	1
Calcium Carbonate	1
NaCl	1
Total	100
C.P%	17.5
Metabolizable energy	2950 Kcal/Kg

Table.2 The chemical composition of alfalfa hay, Panicum hay, and concentrated diet.

Materials %	Alfalfa hay	Panicum hay	concentrated
Moisture	8.46	5.18	1.38
Total protein	14.4	14.17	17.5
Ether extract	0.8499	0.6	2.75
Crude fiber	33.34	30.14	6.25
Ash	10.0616	12.64	5

Slaughtering

Body weight of carcass features (lean, bone, fat), and other carcass metrics weighted by using an electrical balance. Lambs were slaughtered when they reached the required body weight. The lambs fasted overnight before being slaughtered (12 hours) with only water available. The dressed carcass was comprised of the body, and the weights of the hot carcass were recorded. As well as tail fat, kidney and pelvic fat, abdominal fat, and heart fat, which were separated and weighed immediately after slaughter. The carcasses were instantly weighed as an empty body weight. The carcasses were kept at -4 °C for the duration of the next day. carcass fat was mention above,

back fat was measured by using Vernia, and rib eye muscle area was determined by digital planometer according to (Duckett et al 2007) Dressing percentages were calculated using the following formulas:

$$\text{Dressing \% (1)} = \frac{\text{slaugher weight}}{\text{live body weight}} \times 100$$

$$\text{Dressing \% (2)} = \frac{\text{slaugher weight}}{\text{empty body weight}} \times 100$$

The rib eye area was taken by tracing the longissimus dorsi muscle at the 12^{th} rib, using tracing paper, and Line Chart measured the area. (Figure 1).

Circulated by Measuring Area= Total cells =No. of full cells+1/2(No. of partial cells).

Figure: (1) Rib eye area

Physical Dissection of carcasses

Left half of the corpse after it had been physically dissected into two equal pieces (Duckett *et al*., 2007). As they were prepared for a physical dissection by being weighted and frozen at -20°C. The frozen portions were thawed at room temperature, and the lean, fat, and bone tissues were separated with a sharp knife. The fractions of the three tissues were then estimated based on the weight of the carcass sections after the three tissues were individually weighted on a scale with a sensitivity of 5 gm. Additionally, the rib eye region muscle and the thickness of subcutaneous fat between ribs 12 and 14 were measured.

Statistical analysis

The data statistically analyzed utilizing the procedure of (SAS, 2003) in conjunction using the (CRD) design, according to the following model:

$Yijk = \mu + Fi + eijK$

Standard errors, differences within means were calculated by Duncan test (Steel and Torrie., 1984).

RESULTS AND DISCUSSION

The data obtained in the current study is shown in Table 3, which reveals the effect of grass (Panicum or Alfalfa) on some carcass characteristics of Arabi lambs. Lambs reared on Panicum or Alfalfa grass are significantly heavier ($P \leq 0.05$) in live body weight (LBW) (48.63 and 47.13 kg) as compared to control (45.29 kg). Also, the grass effect stated a significant increase in hot carcass weight (HCW) for the Panicum and Alfalfa groups and recorded 24.93 and 23.50 kg, respectively, compared to control (21.86 kg), and cold carcass weight (CCW) (24.53 and 23.23 kg, respectively), compared to control (21.45 kg).

On the other hand, slaughter dressing weight (SDW) increased significantly ($P \leq 0.05$) in grass groups and recorded 51.26 and 50.44% for Alfalfa and Panicum, respectively, when compared to control (48.28%). Empty dressing weight (EDW) also increased at a significance level of ($P \leq 0.05$) in the Panicum group (50.44%) and the Alfalfa group (49.28%) compared to the control (47.36%).

The results of current study with agreement with the results of Eyoh *et al.*, (2019), whom reported *Panicum* recommended for fattening and reproduction of West African Dwarf goat production, and Panicum hay can be used in combination as maintenance ration for WAD goats in the tropics.

Table (3): Effect of Alfalfa and Panicum grass feeding on some carcass characteristics of Arabi lambs (Means ± S.E.).

Parameters	Treatments			
	Control	Alfalfa	Panicum	Overall mean
Live body Weight (Kg)	45.38 c ±0.20	47.31 b ± 0.12	48.61 a ±0.26	47.10 ±0.49
Hot carcass Weight (Kg)	21.86 c ± 0.23	23.50 b ± 0.15	24.93 a ± 0.08	23.43 ±0.45
Cold carcass weight (Kg)	21.45 c ± 0.22	23.23 b ± 0.33	24.53 a ±0.06	23.07 ±0.46
Dressing% (slaughter weight) (Kg)	48.28 b ± 0.69	49.85 a ± 0.22	51.26 a ±0.28	49.80 ± 0.48
Dressing% (empty weight) (Kg)	47.36 b ± 0.70	49.28 a ± 0.61	50.44 a ± 0.17	49.03 ±0.52

Means with different letters within each row differ significantly (P≤0.05) according to Duncan's test.

These findings were not consistent with Wildeus *et al,* (2007) results which confirmed the superiority of alfalfa hay treatment on Panicum grass hay treatment in cold weight and dressing percentage of Spanish young goat's carcasses, researchers point out that this superiority is due to the deferent of the proteins level between the two treatments. It also not agreed with Titi *et al,* (2010), where they indicated that there were no significant differences between the treatments in the dressing percentage of Shami goat kid's carcasses offered to them barley straw instead of alfalfa hay. Theurer *et al.* (1999), stated that measurements of calf carcasses were unaffected when alfalfa hay was replaced by wheat straw. Similarly, Abdulla, (2005), who stated that the characteristics of carcasses and meat did not differ significantly between the treatments containing alfalfa hay or barley straw provided to Awassi sheep.

Table 4 demonstrated that tail fat decreased significantly (P≤0.05) in Panicum group (2.58 kg) in comparison to control (2.93 kg), also abdominal fat decreased significantly in Panicum group (0.50 kg) compared to Alfalfa and control groups, which recorded 0.85 and 0.90 kg respectively. In regard to rib eye area, Panicum lambs have higher rib eye area (18.53 Cm^2), compared to Alfalfa and control groups (17.66 and 16.80 Cm^2). Data from the physical dissection of three ribs (Table 5) were statistically analyzed and demonstrated an increased significantly (P≤0.05) the lean in Panicum group (15.83 kg) in comparison with Control and Alfalfa groups, which recorded 11.79 and 13.49 kg respectively, while bone percentage decreased significantly in Panicum group (24.28% as compared with Control group (30.65%), and fat percentage (11.19%) in comparison with Control and Alfalfa groups (14.33 and 14.70% respectively). The results of bone and fat percentages reflect on lean percentage, which increased significantly (P≤0.05) in Panicum group (64.52%) compared to Control and Alfalfa groups (55.01 and 58.02%). The current study's findings are consistent with those of Eyoh *et al.* 2019, who stated that Panicum is suggested for fattening and reproduction in West African dwarf goat production and that Panicum hay can be utilized in combination as a maintenance feed for WAD goats in tropical regions.

Table (4): Effect of Alfalfa and Panicum grass feeding on fat partitioning and rib eye era of Arabi lambs (Means ± S.E.).

Parameters	Treatments			
	Control	Alfalfa	Panicum	Overall mean
tail fat (Kg)	2.93 a ±0.05	2.68 ab ± 0.05	2.58 b ± 0.10	2.73 ±0.06
Kidney and pelvic fat (Kg)	0.37 a ± 0.02	0.42 a ± 0.06	0.34 a ± 0.05	0.38 ±0.02
Abdominal fat (Kg)	0.90 a ± 0.11	0.85 a ± 0.05	0.50 b ± 0.01	0.75 ±0.07
Heart fat (Kg)	0.26 a ± 0.02	0.34 a ± 0.02	0.27 a ± 0.04	0.29 ±0.01
Rib eye area (Cm^2)	16.80 b ± 0.20	17.66 ab ± 0.44	18.53 a ± 0.03	17.66 ±0.28
Back fat thickness (mm)	1.23 a ± 0.07	1.28 a ± 0.15	1.14 a ± 0.03	1.21 ±0.06

Means with different letters within each row differ significantly (P≤0.05) according to Duncan's test.

Table (5): Effect of Alfalfa and Panicum grass feeding on carcass physical dissection of Arabi lambs carcasses. (Means ± S.E.).

Parameters	Treatments			
	Control	Alfalfa	Panicum	Overall mean
Cold Carcass weight (Kg)	21.45 c ± 0.22	23.23 b ± 0.33	24.53 a ± 0.06	23.07 ±0.46
Bone (kg)	6.57 a ± 0.10	6.32 a ± 0.42	5.95 a ± 0.41	6.28 ±0.19
Fat (kg)	3.08 a ± 0.31	3.41 a ± 0.29	2.74 a ± 0.08	3.08 ±0.15
Lean (kg)	11.79 b ± 0.19	13.49 b ± 0.80	15.83 a ± 0.49	13.70 ±0.64
Bone %	30.65 a ± 0.16	27.26 ab ±2.16	24.28 b ± 1.68	27.40 ±1.21
Fat %	14.33 a ± 1.32	14.70 a ± 1.26	11.19 b ± 0.35	13.41 ±0.77
Lean%	55.01 b ± 1.49	58.02 ab ± 2.70	64.52 a ± 2.02	59.18 ±1.76

Means with different letters within each row differ significantly (P≤0.05) according to Duncan's test.

Al-Jorani *et al.* (2020) did not note a significant increase in lean in local cross-breed goat corpses, which is incompatible with the significant gain in lean% seen during the physical dissection of lambs from the Panicum group. Panicum Mombasa grass was fed instead of the usual roughage (alfalfa and straw), and it had no negative effects. The plant's seasonal output in the field, as well as how much and how the breeder and farmer profit from the plant's dense foliage, continue to influence the chosen way of use.

CONCLUSIONS

Panicum can take the role of alfalfa because of his quick growth, resistance to extreme weather, and capacity to be palatable to sheep. Additionally, to raise the Arabi lambs' productive parameters Panicum grass feeding also enhances carcass characteristics, including cold carcass, lean, and fat.

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CONFLICT OF INTEREST

There are no conflicts of interest, according to the authors.

أثر التغذية على البونيكام بومباسا والجت في صفات الذبيحة للحملان العرابية

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الخلاصة

لدراسة تأثير التغذية على نوعين مختلفين من العلف الأخضر(البونيكام او الجت) في صفات الذبيحة بعد فترة تسمين تسعون يوما، تم استخدام أربعة وعشرون حملا عرابيا، قسمت الى ثلاثة مجاميع: المجموعة الأولى (السيطرة) غذيت على العليقة القياسية مع الخروج للرعي، بينما غذيت المجموعة الثانية والثالثة على العليقة القياسية مع اعطاءها او البونيكام او الجت على التوالي، تبين من نتائج التحليل الاحصائي لبيانات الدراسة، التفوق المعنوي لمجموعتي الجت والبونيكام معنويا ($P\leq0.05$) في وزن الجسم الحي ووزن الذبيحة الحار والبارد ونسبة التصافي المملوء والفارغ مقارنة بمجموعة السيطرة. في حين انخفض معنويا وزن الالية في حملان مجموعة البونيكام مقارنة بمجموعة السيطرة، في حين سجل انخفاضا معنويا ($P\leq0.05$) في دهن البطن وارتفاعا معنويا لمساحة العضلة العينية لمجموعة حملان البونيكام. بينما ارتفع معنويا وزن العضل معنويا عند اجراء الجرد الفيزيائي لذبائح الحملان التي غذيت على البونيكام. بشكل عام تفوقت مجموعتي الجت والبونيكام في معظم صفات الذبيحة، وسجلت حملان مجموعة البونيكام أفضل صفات للذبائح.

الكلمات الدالة: الجت، الأغنام العرابية، صفات الذبيحة، البونيكام

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