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Influence of Ration Number of Feeding Times System on Productive and Slaughter Traits of Fattening Male Lambs

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Abstract

THE AIM of this experiment is to compare two feeding systems based on the productive performance and some carcass characteristics of fattened male lambs: feeding once and feeding twice daily. We conducted this experiment by fattening two groups of Awassi male lambs, totalling twenty weaned male lambs ranging in age from 4 to 6 months. The average weight of all lamb[23.28 ±1.27]. They were distributed equally, according to weight, into two groups, so that each group consisted of ten lambs. This experiment continued for eighty days. Following a 12-hour food withholding period, we slaughtered six lambs from each group, taking their total weight prior to slaughter. Then the lambs were slaughtered, and the carcass measurements were taken. The results did not show any significant differences for most measurements, such as final weight, weight gain, feed conversion efficiency, feed intake, carcass weight, dressing percentage, and carcass residues from the head, feet, and skin. There were also no big differences in the viscera of the carcass, like the lungs, heart, liver, spleen, kidneys, intestines, the weight of the full and empty rumen, or the weights of different fats, like buttocks, abdomen, kidney, and heart fat. There were also no big differences in the area of the eye muscle or the thickness of the subcutaneous fat, or in the major and minor cuts, except for the weight of the breast. Moreover, the proportions of muscle, fat, and bone remained consistent. The net second transaction exhibits an arithmetic advantage.

Keywords: number of feeding times, Lambs, production, carcass.

Introduction

One of the challenges of sheep farming is meeting the demanding consumer market for quality meat. Researchers have reported that intensive systems are an effective method for raising feedlot lambs. This system shortens the production cycle allowing for increased carcasses processed in the same amount of time and better quality meat.

Maximization of farm animal's productivity depends on the optimal feeding frequency and quantity to decrease feed wastage and consequently, the costs. Besides, a feed management strategy that maximizes animal growth is a significant issue. It was estimated that feeding cost is about 64-70% of the total cost in the animal production process.

Animal scientists have discovered new feed ingredients for use in the diets of lambs , which has contributed to greater weight gains and improved meat quality. However, the scope of productive efficiency in feedlot animals also depends on other factors, including the strategy of how the diet is fed.

The purpose of intensive lamb systems is to satisfy the feeding requirements of the animals, however, a lack of standardization of strategies in the frequency of feeding the diet exists. Studies on feeding frequency in large ruminants, specifically dairy cattle, are available. However, in small ruminants, the scientific evidence to elucidate the appropriate feeding frequency in lambs is limited.

The results varied about the effect of repeated feeding in ruminants on their productive performance, while the researchers indicated its positive effect on their productivity and attributed this to giving the rumen a greater opportunity to digest and empty the nutrients from it by giving food in smaller batches and meals and improving the digestion coefficient of crude protein and dry matter.

[1]. [2] also noted that implementing a program and feeding schedule that includes small meals and more frequent daily intervals enhances the rate of rumen emptying, thereby increasing the transit of fermented food into the intestine. [3] Also indicated that increased repeat feeding in the rumen improved the

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stability of rumen fermentation and thus increased milk production for cows due to the decrease in fluctuations and changes in rumen acidity, ammonia, and volatile fatty acid concentration when increasing the number of feeding times to four times a day. Additionally, it significantly improved the digestion coefficient of chemical compounds in the food, both for crude protein and organic matter. [4] Indicated that multiple feedings improve the production and efficiency of microbial protein assimilation. Multiple feeding leads to the simultaneous liberation of nitrogen from the organic matter, which is more beneficial than a single feeding. Thus, it improves bacterial growth and nitrogen supply. It also improves the supply of amino acids and energy to tissues, affecting animal growth. As pointed out by [5]. Multiple feedings make food levels stable in the blood because of the longer period given to the rumen to analyze food and thus the continuous absorption of these substances from the body.

In summary, multiple feedings give a constant supply of nutrients to the tissues during the day compared to when given once a day, and the constant supply of nutrients to the tissues improves the growth and sedimentation of crude protein in the carcass. [6] and [7] indicated that there was no effect of recurrence on the rate of passage of food in the rumen. [8] did not show any significant effect of feeding frequency on the rate of digestibility of crude protein and dry matter when Najdi lambs were fed twice versus once a day.

Thus, the authors hypothesized that by increasing the frequency of feeding diets throughout the day, this could positively stimulate the productive and behavioral characteristics of feedlot lambs to diets that consist of hay and concentrate, in addition to promoting better quality meat.

Thereby, the objective of this study was to evaluate the intake, performance, carcass characteristics, and meat quality of feedlot lambs subjected to two different feeding frequency.

Material and Methods

Twenty local Awassi lambs, males, were used in this research. They were weighed and divided into two groups, The average weight of all lamb[23.28 ±1.27], both of which were fed free on concentrated fodder consisting of 70% barley, 22% wheat bran, 7% soybean meal, 1% salt and limestone. The first group was fed twice a day and the second group once a day. The weights of the lambs, the feed intake and the efficiency of feed conversion were measured during the period of 80 days. In addition, 12 male lambs were slaughtered finish trail withholding the ration from them for a period of 12 hours. The live weight was recorded before slaughter, and this weight was adopted to calculate the dressing percentage. After that, the buttocks, pelvic fat and kidneys were separated, their weights were recorded, and the carcasses were divided into two halves, left and right. It was cut into major and minor pieces according to the method of [9].

The thickness of the subcutaneous fat was measured at rib 12 above the eye muscle using an electronic measuring ruler (Varniar), and the area of the eye muscle was drawn at rib 12 and its area was calculated using the method of squares. The physical separation of the muscle, fat and bone tissues of the six ribs was conducted using sharp knives and according to the percentage of each of them. To find out the effect of the treatment between the two groups and to know the significance of these differences, the obtained data were analyzed using the t-test.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Whereas:-

X1 = average of the first sample (one-time feeding treatment).

X2 = average of the second sample (twice feeding treatment).

S2 = sample variance (population).

n1 = the number of oversight of the first sample.

n2 = the number of oversight of the second sample.

Results and Discussion

Live weight gain results of the statistical analysis (Table 3) show that there are no significant differences in the average daily and total weight gain of the lambs of the first treatment (feeding twice) (126.13 gm, 10.91 kg) from the rate of lambs of the second treatment (feeding once) (110.18 gm., 8.95 kg). although there was an arithmetic superiority in favour of the first treatment, and this may be attributed to the increase in feed intake by the first group was (977.68 gm.) compared to (905.19 gm.) for the second group, and the food conversion efficiency improved in favor of the first group (7.91) compared to (8.22) for the second group. This may be due to the accumulation of feed in the feeders leading to its contamination and moisture due to the saliva of the animal, which can cause the feed to clump. As a result, the animal is reluctant to eat this accumulated feed. Therefore, the repetition of feeding occurs in the feed, which helps to encourage the animal to eat a larger amount of feed, which in turn is reflected in an improvement in the weight gain of the animal, although it did not reach the level of significance.

[10] Indicated that Awassi lambs increased their feed intake when fresh feed was provided to them

continuously, and the frequency of feeding with fresh feed stimulates the appetite of the lambs, and thus its effect on the performance of the lambs and carcass characteristics. [11] And [12] indicated that the frequency of feeding increased weight of the lambs because of stimulation of the digestive system, salivary glands, and rumen secretions. It also affected the rumen resuscitation positively. [13] confirmed that the aforementioned changes previously, it could lead to an improvement in the efficiency of microbial growth, and as a result, an improvement in daily weight gain and protein sedimentation.

With regard to weight gain, these results agreed with [14-17] who pointed that there were no significant differences in weight gain when the number of feeding times varied. While these findings are not consistent with [18-23, 13, 5, 21] who confirmed the existence of significant differences with the different number of feeding times, as significant increases in weights were observed with the increase in the number of feeding times. The results of this study also agreed with those of [15-17, 24-26, and 22]. And who supported the absence of a significant effect of number of feeding times on the final weights of lambs. While consequences did not agree with the results of [27], [11] and [19] who noticed that the frequency of feeding caused significant differences in the final weights and attributed the reason for this to that the frequency of feeding increased the level of Growth hormone in the blood, which stimulates increased growth.

As for the feed intake, the results of this experiment agreed with [17-19, 12, 13, 28, 29,22, , 23] who confirmed that feeding frequency increased the amount of forage intake. While the consequences of this experiment trails did not agree with those of [15,30,7,2] who did not notice a significant change. In feed intake with increased frequency of feeding.

As for the efficiency of feed conversion, consequences agreed with the consequences of [5], [19], and [17], who indicated that the frequency of feeding was accompanied by an improvement in the efficiency of feed conversion because of the previously mentioned reasons. While the consequences of this experiment disagreed with consequences of [24,32,16,22] who did not notice a difference in the efficiency of feed conversion when increasing the feeding frequency.

Table (4), Carcass weight and dressing percentage: The results of the statistical analysis in Table (4) did not show any significant differences for the weights of hot carcasses in the experiment, which amounted to (14.49) kg for the first treatment compared to (14.00) kg for the second treatment. Average final weights before slaughter. These results are in agreement with [14,24,32,16,22, 26]who showed no Significant differences between carcasses when feeding is repeated or not. While consequences of this study differed with the consequences of [5] and [19] who indicated that the increase in carcass weight when increasing the feeding frequency may be attributed more to the amounts of protein deposited in the carcass and to a lesser extent to the fat deposited in the carcass.

The results of the statistical analysis also did not show any significant differences in the percentage of dressings between the first treatment (48.00%) and the second treatment (47.6%), and this is naturally due to the absence of significant differences between the live weights before slaughter and the carcass weights of the two treatments. [29] and [26].

Table (5), Slaughter results showed no significant differences were observed in the proportions of slaughter residuals such as head, feet and skin (Table 5). These results agreed with [14,19,17,26] who confirmed that there was no significant effect of number of feeding times on carcass offal and viscera.

Table(6): Slaughter results showed no significant deffrences were observed in the proportions of edible and non-edible entrails relative to the live weight before slaughter between each of the first treatment (twice feeding) and the second treatment (one feeding) (Tables 6 and 7). These results agreed with [14,19,22,17,26] who confirmed that there was no significant effect of number of feeding times on carcass offal and viscera.

Table (8), discrete fat: consequences statistical analysis indicated that there were no significant differences in the proportions of fat, abdominal fat, kidney fat, heart fat, and the total separate fat. consequences agreed with the consequences of [16] and [22] who indicated that there is no significant effect of number of feeding times on the separated fat of the carcass, [17] indicated that feeding frequency had no effect. Significantly increased fat in the heart, abdomen and kidneys, but significantly reduced pelvic fat. [31] and [19] indicated that feeding frequency increased body fat deposition significantly. As for [32] and [12], they confirmed that the frequency of feeding significantly reduced the deposition of fat in the body, and as indicated by [26] that the frequency of feeding significantly reduced the internal fat of the body.

Eye muscle are results of the statistical analysis of the experiment pointed that there is no significant differences been found in the area of the eye muscle between the first group (twice feeding) as it amounted to (11.01) cm2 and the second group (once feeding) which amounted to (9.32) cm2 and Table (9). These results are consistent with [19] and [26], who did not observe significant differences between the treatments in which the number of feeding times differed (Table 9).

Subcutaneous fat thickness: The consequences did not show any significant differences in the subcutaneous fat thickness rates between the first treatment (twice-feeding) (7.98 mm) and the second treatment (once feeding) (7.43 mm). Table (9) these results agreed with the results of [19], [16], [22] and [26] who confirmed that there was no significant effect of number of feeding times on the thickness of subcutaneous fat. While these consequences disagreed with [32] and [12] as they confirmed that feeding, frequency reduced the thickness of subcutaneous fat.

Table (10), Major and minor carcass cuts: With regard to the main carcass cuts, which included (thigh, pelvis, back, six ribs and shoulder, in addition to the total number of these cuts), The consequences did not show any differences between the first and second treatments in all these cuts. As for the secondary pieces of the carcass, which included (chest, neck, buttocks, and all of these pieces combined), only significant differences were noticed in the percentage of breast weight, as the second group was significantly superior ($a \leq 0.05$) to the first group, while the rest of the pieces did not differ. other spiritually. (Table 10, 11) (the weight of pieces is relative to the weight of the carcass). These results agreed with the results of [17] and [26], who did not observe any significant differences in the carcass weights of lambs fed on maltiple feeding times.

Table (12), Ratios of muscle, bone, and adipose tissue: The results of the physical inventory of the six ribs did not show any significant differences in the ratios of lean, bone, and fat between the first and second treatments, respectively, as shown in Table (12). These consequences were agreed with [14] and [22] who did not notice any significant difference in any of the muscle, bone and adipose ratios. Whereas, [19] indicated that there was a significant difference in the percentage of protein when increasing the number of feeding times , while the percentage of fat was not affected significantly.

Table (13), longitudinal carcass measurements: The consequences of the statistical analysis showed that there were significant differences in the chest circumference of the carcass in favour of the first treatment (70.11 cm) versus (66.02 cm) for the second treatment. As for the rest of the longitudinal measurements of the carcass (carcass length, thigh circumference, and breast depth), no significant differences were observed. These consequences disagreed with [26] and [23], who did not observe significant differences in the breast circumference of the slaughter, while it agreed with them in the rest of the traits.

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Declaration of Conflict of Interest

The authors declare that there is no conflict of interest.

Author`s contributions

The first and second researchers participated in designing the research and carried out the practical aspect. The third researcher completed the task of statistical analysis, making tables, and writing.

TABLE 1. Show composition and percentage of ration used in trial

Ration component %	**Percentage** %
Barley	70
Bran	22
Soybean meal	7
Lime stone	0.5
Salt	0.5

TABLE 2. Show chemical composition of experimental ration

Nutritional components %	**Percentage**
Dry matter	91.8
Crude protein	14.5
Ether extract	2.3
Crude fiber	8.7
Ah	4.5
Soluble carbohydrate	61.8
Metabolizable energy Kcal/ kg dry matter	2637

TABLE 3. Effect feeding once and feeding twice daily on Production performance and growth rate of male lambs

Parameters	One	Twice
Initial body weight (kg)	23.45	23.11
	1.20±	1.35 ±
Final body weight (kg)	32.40	34.02
	1.18 ±	1.89 ±
Total body weight gain (kg)	8.95	10.91
	1.13 ±	1.21 ±
Daily weight gain (kg)	110.18	126.13
	11.97 ±	11.56 ±
Daily feed intake (g)	905.19	997.68
Feed efficiency conversion	8.22	7.91

TABLE 4. Effect feeding once and feeding twice daily on Some carcass characteristics of male lambs

Characteristics	Once	Twice
Hot carcass weight (kg)	14.003	14.49
	1.02 ±	1.17 ±
Dressing percentage	47.6	48.00
	0.75 ±	0.82 ±
Slaughter weight (kg)	29.63	30.20
	2.01 ±	2.112 ±

TABLE 5. Eeffect feeding once and feeding twice daily on Slaughter residues of the carcass of male lambs

Characteristics	Once	Twice
Head %	6.43	6.30
	0.37 ±	0.26 ±
Feet %	2.61	2.42
	0.17 ±	0.21 ±
Skin %	10.81	11.01
	0.92 ±	0.65 ±

TABLE 6. Effect feeding once and feeding twice daily on internal edible organs percentage of the carcass of male lambs

Characteristics	Once	Twice
Lung %	1.49	1.60
	0.06 ±	0.05 ±
Heart %	0.45	0.41
	0.005 ±	0.01 ±
Liver %	1.61	1.60
	0.03 ±	0.02 ±
Testis %	0.38	0.42
	0.03 ±	0.07 ±
Spleen %	0.16	0.17
	0.001 ±	0.01 ±
Kidney %	0.19	0.20
	0.01 ±	0.01 ±

TABLE 7. Effect feeding once and feeding twice daily on internal inedible organs percentage of the carcass of male lambs

Characteristics	Once	Twice
Intestine %	7.20	8.86
	1.10 ±	0.50 ±
Full rumen %	1092	10.20
	0.69 ±	0.51 ±
Empty rumen %	4.21	4.05
	0.35 ±	0.32 ±

TABLE 8. Effect feeding once and feeding twice daily on total separate fat percentage of the carcass of male lambs

Characteristics	Once	Twice
Tail fat %	6.34	6.75
	0.91 ±	0.61 ±
Pelvic fat %	0.27	0.50
	0.20 ±	0.03 ±
Kidney fat %	0.290	0.350
	0.07 ±	0.06 ±
Heart fat %	0.087	0.083
	0.01 ±	0.01 ±
Total fat %	7.02	7.71
	0.92 ±	0.52 ±

TABLE 9. Effect feeding once and feeding twice daily on eye muscle area and subcutaneous fat thickness of the carcass of male lambs

Characteristics	Once	Twice
Eye muscle area (cm2)	9.32	11.01
	0.99 ±	0.91 ±
Subcutaneous fat thickness (mm)	7.43	7.98
	0.77 ±	0.92 ±

TABLE 10. Effect feeding once and feeding twice daily on major cuts percentage of the carcass of male lambs

Characteristics	Once	Twice
Major cuts %	60.48	62.74
	3.34 ±	2.09 ±
Leg %	25.2	25.11
	1.21 ±	1.01 ±
Chump %	5.935	6.37
	0.27 ±	0.32 ±
Loin %	6.01	7.19
	0.72 ±	0.12 ±
Best end neck %	4.69	5.12
	0.45 ±	0.61 ±
Shoulder %	18.851	18.951
	1.32±	0.32 ±

TABLE 11. Effect feeding once and feeding twice daily on minor cuts percentage of the carcass of male lambs

Characteristics	Once	Twice
Minor cuts %	39.51	37.25
	2.61 ±	1.72 ±
Breast %	*20.91	18.25
	0.82 ±	0.37 ±
Neck %	3.09	3.10
	0.13 ±	0.10 ±
Tail %	15.5	15.9
	2.54 ±	1.40 ±

TABLE 12. Effect feeding once and feeding twice daily on Lean , bone and fat percentages of the carcass of male lambs

Characteristics	Once	Twice
Lean %	52.00	50.00
	1.92 ±	2.31 ±
Bone %	25.00	24.00
	0.7 ±	1.01 ±
Fat %	23.00	26.00
	1.41 ±	2.33 ±

TABLE 13. Effect feeding once and feeding twice daily on some carcass length measurements of the carcass of male lambs

Characteristics	Once	Twice
Carcass length (cm)	93.35	94.12
	1.95 ±	2.01 ±
Chest perimeter (cm)	66.02	*70.11
	2.13 ±	2.05 ±
Hind quarter perimeter (cm)	55.37	57.21
	1.25 ±	1.31 ±
Chest depth (cm)	25.47	26.87
	0.85 ±	0.72 ±

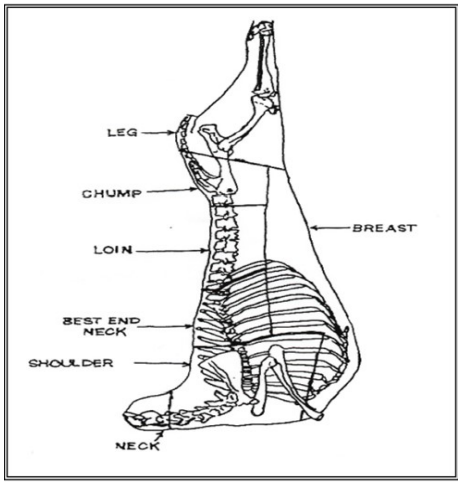

Fig.1. Cutting the carcass according to the method of [9].

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تأثير عدد مرات التغذية في بعض الصفات الانتاجية والذبحية لحملان التسمين الذكرية

نوفل محمد أمين سعيد ، سنان عصام الدين صلاح و يعلى العدوان

قسم الإنتاج الحيواني - كلية الزراعة - جامعة تلعفر - تلعفر - العراق.

الملخص

ان الهدف من هذه التجربة هو المقارنة بين نظامين من التغذية على الاداء الانتاجي وبعض صفات الذبيحة للحملان الذكرية المسمنة وهما التغذية لمرة واحدة والتغذية لمرتين يوميا. فقد اجريت هذه التجربة بتسمين مجموعتين من الحملان الذكرية العواسية والبالغ عددهم عشرين حملا ذكرا بعمر الفطام تتراوح اعمارها بين 4 -6 أشهر. متوسط الاوزان[23.28 ±1.27]. تم توزيعها حسب الوزن الى مجموعتين بشكل متساوي، بحيث كانت كل مجموعة مكونة من عشر حملان. وقد استمرت هذه التجربة لمدة ثمانين يوما. وبعد ذلك تم ذبح ستة حملان من كل مجموعة بعد حجب الغذاء عنها 12 ساعة واخذ الوزن الكلي قبل الذبح. ثم ذبحت الحملان وتم اخذ قياسات الذبيحة. وتم تحليل البيانات احصائيا. لم تظهر التجربة اي فروقات معنوية لمعظم القياسات مثل الوزن النهائي والزيادة الوزنية وكفاءة التحويل الغذائي والعلف المتناول ووزن الذبيحة ونسبة التصافي ومخلفات الذبيحة من الراس والاقدام والجلد. كما لم تظهر فروقات معنوية في احشاء الذبيحة مثل الرئتين والقلب والكبد والطحال والكليتين والامعاء ووزن الكرش المملوء والفارغ واوزان الدهون المنفصلة مثل دهن الالية والبطن والكلية والقلب، ولا في مساحة العضلة العينية وسمك الدهن تحت الجلد ولا في القطع الرئيسية والثانوية فيما عدا وزن الصدر وكذلك لم يلاحظ وجود فروقات في نسبة العضل والدهن والعظم. على الرغم من وجود تفوق حسابي لصالح المعاملة الثانية.

الكلمات المفتاحية: عدد مرات التغذية، حملان، إنتاج، الذبيحة.