Some carcass measurements and physical dissection for the thigh cut of Iraqi Awassi lambs dosed with flaxseed oil

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Abstract

This was conducted to study some quantitative and qualitative traits for meat of Iraqi Awassi lambs and dosed with flaxseed oil in the fields and laboratories of the Department of Animal Production / College of Agriculture - Tikrit University for the period from 10/14/2019 to 2/27/2020. In this experiment, 12 Awassi lambs were used, with average primary weights of 3.6224.18 kg, and their ages ranged between 5-6 months. The animals were distributed randomly after taking their initial weights and then divided into four groups, and each group included three lambs. In this experiment using the feeding and individual breeding system in cages, the lambs were numbered with plastic numbers and placed in individual cages (the area of each cage was (1 x 1.5) m in semi-open pens, the lambs were considered treatment No. (1) as a control treatment and they were not given Flaxseed oil. addition groups were given (0.06, 0.08, 1)% mL of flaxseed oil respectively. The concentrated feed was determined on the basis of dry matter at 3% of the live body weight, with hay being provided freely as a source of coarse food. The percentage of flaxseed oil was changed weekly depending on the increase in body weights of the lambs. As for the rib-eye muscle area, a significantly excelled(P0.05) was observed in the third and fourth treatments on the rest of the treatments. Also, significant differences ($P\leq0.05$) were found in the thickness of the lipid layer, where the addition factors decreased compared to the control treatment , All animals were slaughtered at the end of the experiment. It indicated that the third and fourth equations (T3, T4) were significantly ($P\leq0.05$) superior to the control treatment in live body weight, hot carcass weight, and empty body weight. As for the dressing percentage, the highest percentage was in the third treatment (T3) and the lowest in the control treatment (T1). The results also indicated during the physical dissection of the thigh cut that a significantly excelled ($P\leq0.05$) occurred in the percentage of meat and bone compared to the percentage of fat.

بعض قياسات الذبيحة والفصل الفيزيائي لقطعية الفخذ للحملان العواسية العراقية المجرعة بزيت بذور الكتان

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الخلاصة

اجريت هذه لدراسة بعض الصفات الكمية والنوعية للحوم والحملان العواسية العراقية المجرعة بزيت بذور الكتان في حقول ومختبرات قسم الانتاج الحيواني / كلية الزراعة – جامعة تكريت للفترة من 2019/10/14 لغاية 2020/2/27. في هذه التجربة تم استخدام 12 حملان عواسي بمتوسط وزن ابتدائي 3.62±24.18 كغم وتراوحت اعمارهم بين 5-6 أشهر . تم توزيع الحيوانات بشكل عشوائي بعد اخذ أوزنها الاولية ثم تم تقسيمها إلى أربع مجموعات ، وشملت كل مجموعة ثلاثة حملان . في هذه التجربة استخدام نظام التغذية والتربية الفردية في الاقفاص ، تم ترقيم الحملان بأرقام البلاستكية ووضعها في اقفاص فردية (مساحة كل قفص (1×1.5) م في حضائر نصف مفتوحة ، تم اعتبار الحملان المعاملة رقم (1) كمعاملة سيطرة ولم يتم إعطاؤها زيت بذور الكتان .اعطيت المجموعات الاضافة(0.06 ، 0.08 ، 1)% مل من زيت بذور الكتان على التوالي . تم تحديد العلف المركز على إساس المادة الجافة بنسبة 3% من وزن الجسم الحي مع تقديم التبن بشكل حر مصدرا للعلف الخشن ويتم تغير النسبة المئوية لزيت بذور الكتان أسبوعيا اعتماداً على زيادة

اوزان الجسم من الحملان . تم ذبح جميع الحيوانات في نهاية التجربة . اشارت الى تفوق المعادلة الثالثة والرابعة (T3 ، T4) معنوياً (P≤0.05) على معاملة السيطرة في وزن الجسم الحي ، وزن الذبيحة الحار ، وزن الجسم الفارغ . اما فيما يخص نسبة التصافي كانت اعلى نسبة في المعاملة الثالثة (T3) واقل نسبة في معاملة السيطرة (T1) .كما اشارت النتائج خلال الفصل الفيزيائي لقطعة الفخذ حصول تفوق معنوية (P≤0.05) في نسبة اللحم والعظم مقارنة بنسبة الدهن .اما فيما يخص مساحة العضلة العينية لوحظ تفوق معنوياً (P≤0.05) في المعاملة الثالثة والرابعة على بقية المعاملات ، كذلك تبين وجود فروق معنوية (P≤0.05) في سمك الطبقة الدهنية حيث انخفضت معاملات الاضافة مقارنة بمعاملة السيطرة .

***Research paper from MSc thesis for the First author**

Introduction

Meat is one of the most important sources of protein that a human needs, by providing the body with animal protein. The rate of what an individual consumes in a society is considered .One of the criteria that can measure the progress and development of society and its health benefits for humans (11). Therefore, breeders seek to obtain high-weight carcasses that are considered indicators of meat production (10). Sheep are considered one of the main sources of meat production in many countries of the world, where male sheep under the age of one year are slaughtered to benefit from their meat for human consumption .consequently, researchers resorted to using new technologies aimed at improving the quality of meat, which include tenderness, juiciness, flavor, color, texture, and the degree of sweating of meat, which is the main measure of the consumer (17).The natural additives have proven their ability to delay the development and emergence of unwanted flavors and improve the qualities of the meat. Therefore, attention is directed by researchers towards the effect of these natural food additives on a large scale (20). Flax seed is considered one of the most important functional nutrients due to its high content of unsaturated fatty acids, especially (Omega 3) and alpha-linolenic acid (9).The thigh cut is also considered one of the pieces that represent the Carcass in terms of meat, fat and bone (15). The increase in the rib-eye muscle area gives an indication of increased feed consumption and the health status of the animal (12).Therefore, the aim of the present study is to demonstrate the effect of different levels of flax seed oil as nutritional supplements on the quantitative traits of the Awassi lambs.

Materials and methods

This study was conducted in the field of sheep and the laboratories of the Department of Animal Production / College of Agriculture - Tikrit University for the period from 10/14/2019 to 2/17/2020.In the experiment, 12 Awassi lambs with an average weights of 24.18 ± 3.62 kg were used and their ages ranged between 5-6 months. The animals were randomly distributed after taking their initial weights and then divided into four groups, each group included three lambs. in this experiment the feeding system and individual breeding (cages) was used. The lambs were numbered and placed in individual cages (the area of each cage was 1 x 1.5 square meters in semi-open pens, Each cage was equipped with a special feeder for concentrated feed, another for coarse (hay), and containers for drinking water. Also, attention was paid to the health care of animals to avoid potential diseases, where they were vaccinated with the Co-Baghdad vaccine, dosed with Albendazole and Levozan. The experiment animals were fed for a period of 34 days as a preliminary period before starting the experiment, then the lambs were weighed at the start of the experiment after fasting for 12 hours. This weight is the primary weight of the lambs. Then the weight of the lambs continued weekly and until the end of the experiment, concentrated feed was provided to the lambs at an average of 3% of the weight of the live animal, divided into two morning and evening

meals. As for the hay, it is given freely to the animals, and the mineral blocks were placed in front of the animals throughout the period of the experiment to provide the animals with vitamins and minerals as well as drinking water.

Table(1) Chemical composition according to the Components in the experiment diet

T4	T3	T2	Control (T1)	feed material%
50	50	50	50	barley
28	28	28	28	wheat bran
10	10	10	10	corn
10	10	10	10	soybean
1	1	1	1	premix
1	1	1	1	salt
1%	0.08%	0.06%	0 %	flaxseed oil

Final weight and Slaughter process:

At the end of the experiment, the feed was cut off for the lambs for a period of 12 hours, while water was continued afterwards, and then weighed in order to stabilize the final weight (weight at slaughter).

Carcass Traits Measurements:

Hot Carcass Weight:

The hot carcass weight was taken half an hour after the animal was slaughtered, Skinning .

Empty Body Weight:

The empty body weight was calculated by subtracting the weight of the digestive system contents from the weight of the live animal.

Empty body weight = live animal weight - weight of the contents of the digestive system.

Dressing Percentage:

The most accurate Dressing Percentage is calculated by dividing the hot carcass weight into the empty body weight multiplied by 100.

Dressing Percentage% = hot carcass weight / empty body weight x 100

Physical dissection of the thigh cut :

The thigh cut was placed in the refrigerator to dissolve it, then weighed and was physically separated into its components (meat, fat and bone) using sharp knives and medical kit (scalpels - blades) inside a refrigerated room to avoid evaporation of moisture as much as possible. After that, the weights of the mentioned components were recorded and then the percentage was calculated Percentage for each method component (5).

Meat percentage = meat weight / thigh weight x 100

Fat percentage = fat weight / thigh weight x 100

Bone percentage = bone weight / thigh weight x 100

Measuring the rib-eye muscle area, thickness and fat layer:

The area of the rib-eye muscle in the area between the twelfth and thirteenth ribs was measured using semi-transparent wax paper, and then its area was calculated using a polar - compensating planimeter. The thickness of the fat layer was measured in the cut area between ribs 12 and 13 above the eye muscle by (Vernier).

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Statistical analysis:

The Completely randomized design (CRD) was used to study the effect of different treatments on the studied traits. The significant differences between the averages were compared with a multi-data test (7). Program (18) was used in the statistical analysis according to the following mathematical model:

Yij = μ + Ti + eij

where

Yij: the value of viewing j to treatment i.

μ: general average for the trait.

Ti: effect of treatment i (the study included the effect of four treatments).

eij: a random error that is normally distributed with an average of zero and a variation of σ2e

Results and discussion:

The effect of adding different levels of flaxseed oil to the Awassi lambs on the live body weight traits, hot, cold and empty carcass weights and the dressing percentage :

The results in Table 2 indicated the effect of adding different levels of flaxseed oil to the diets of Awassi sheep on the live body weight traits to the presence of significant differences ($p\leq0.05$) between the addition factors compared with the control treatment. Where the third and fourth treatment (T3, T4) excelled the control treatment (T1) and the weights were 39.73, 38.16, 26.03 kg respectively, and no significant differences were observed between the second treatment (T2) and the control treatment and the rest of the treatments. These results are in agreement with (21). The results were not consistent with (16). Table 2 indicates the effect of adding different levels of flaxseed oil to the diets of Awassi sheep on hot carcass weight trait, where significant differences ($p\leq0.05$) were observed between the addition factors and the control treatment, where the third and fourth treatments (T3, T4) excelled the control treatment (T1). and it reached 18.70, 17.70, and 12.35 kg, respectively. No significant differences were observed in the second treatment (T2) and between the control treatment and the rest of the treatments. These above results were in agreement with (14), and the results were not in agreement with (8). The results in Table 2 indicated the effect of adding different levels of flax seed oil to the diets of Awassi sheep on empty body weight trait. Significant differences ($p\leq0.05$) were observed between the addition treatments and the control treatment, where the third and fourth treatment (T3, T4) excelled the control treatment (31.98, 31.33, 22.42 kg, respectively), and no significant differences were observed between the second treatment (T2) and the control treatment. Control (T1), these results agreed with (1), and the results did not agree with each of (8). Table 2 indicates the effect of adding different levels of flaxseed oil to the diets of Awassi sheep on the Dressing Percentage on the basis of empty body weight, where significant differences ($P\leq0.05$) were observed between the addition factors and the control treatment where the third treatment (T3) excelled on the control treatment (T1). The percentages were 58.34 and 55.2%, respectively. The results were in agreement with (4) when 3% of flax oil and sunflower oil were added to the diet of male goats. The results did not agree (8) when using 3% flaxseed oil with 400mg of synthetic vitamin E with 3% of flaxseed oil and 400mg of natural vitamin E. The excelled that was obtained in live weight as a result of adding different levels of flaxseed oil was reflected in the excelled of traits(hot carcass weight, empty body weight and dressing percentage) due to the presence of a high positive relationship between body weight and the mentioned traits.

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Table (2): The effect of adding different levels of flaxseed oil to Awassi lambs on the live body weight trait, hot carcass weights, empty body weight, and dressing percentage

T4	T3	T2	T1	treatment / Traits
38.16± 1.85 a	39.73± 4.47 a	35.06± 3.18 ab	26.03± 3.23 b	live body weight / kg
17.70± 0.28 a	18.70± 1.86 a	16.59± 1.55 ab	12.35± 1.50 b	hot carcass weight / kg
31.31± 0.08 a	31.98± 2.83 a	29.02± 2.78 ab	22.42± 2.91 b	empty body weight(kg)
56.52 ± 0.744 ab	58.34 ± 0.80 a	57.19 ± 0.69 ab	55.21±0.51 b	dressing percentage

1. Values represent averages ± standard error
2. Treatments T1, control treatment without adding flax oil, T2, T3, and T4 treatments for adding flax oil at levels (0.06, 0.08, 1)%, respectively.

3. The different letters within one column indicate that there are significant differences between the treatments at the level (P≤0.05).

Adding different levels of flaxseed oil to Awassi lambs in the physical dissection **of the thigh cut (meat weight, fat weight, bone weight):**

Table 3 indicates the effect of adding different levels of flaxseed oil to the diets of Awassi sheep. There were significant differences (p≤0.05) in meat weight. It was observed that significantly excelled of the third and fourth treatment (T3, T4) on the control treatment (T1), the weights were 1.71,1.66. 1.08 kg, respectively, and no significant differences were observed between the second treatment (T2) and the rest of the treatments, As for the relative weight of meat, there were significant differences (p≤0.05) for the fourth treatment (T4) on the second treatment (T2) and it reached (65.62, 60.10)%, respectively. The reason for the significant increase in the percentage of meat in the thigh cut is due to the decrease in the percentage of fat to meat due to its high in polyunsaturated fatty acids type 3 omega when different levels of flaxseed oil are added (13). No significant differences were observed between the third and first treatment (T3, T1) and the rest of the treatments. These results are consistent with findings (5) when adding different levels of flaxseed powder (3%, 6%, 9%) to the diet to feed Kurdish sheep. The results also indicated in Table 3 that the effect of adding different levels of flaxseed oil to sheep diets Awassi with regard to the percentage of fat weight, it was found that there was a significantly excelled(p≤0.05) for the second and third treatment (T2, T3) on the control treatment and the fourth treatment (T1, T4) and the weights were 0.44,0.42, 0.32, 0.30 kg, respectively, the fat percentage and there were differences significance (p≤0.05) between the addition factors and the control treatment, where the control treatment and the second treatment (T1, T2) excelled on the fourth treatment, where the percentages reached (17.56, 18.82, 12.75)%, respectively. The reason for the decrease in the percentage of fat to the meat may be due to the addition of different concentrations of flaxseed oil that contain concentrations of omega-3 fatty acids, while no significant differences were observed between the third treatment (T3) and the rest of the treatments. These results matched what was obtained (5) when using different levels of flaxseed powder (3%, 6%, 9%), Table 3 indicates that the addition of different levels of flaxseed oil in the diets of Awassi sheep

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indicates a significantly ($p \leq 0.05$) excelled in bone weight for all addition factors (T2, T3, T4) on the control treatment (T1) and reached 0.50, 0.54, 0.54. As for the relative weight of the bone, it was noticed that there were no significant differences between all the addition factors and the control treatment. These results agreed on what was obtained (21), and the results did not agree on what was reached (3).

Table (3): The effect of adding different levels of flaxseed oil to the Awassi lambs on the physical dissection of the thigh cut (meat weight, fat weight, bone weight)

bone weight		fat weight		meat weight		thigh cut kg	Traits / treatment
%	kg	%	kg	%	kg		
20.57 ± 0.53 a	0.35 ± 0.03 b	17.56 ±0.07 a	0.30 ± 0.03 b	61.86 ± 0.95 ab	1.08± 0.15 b	1.74 ± 0.22 b	T1
21.06 ± 0.28 a	0.50 ± 0.03 a	18.82 ± 1.40 a	0.44 ± 0.02 a	60.10 ± 2.92 b	1.44± 0.15 ab	2.39 ± 0.19 ab	T2
20.48 ± 0.96 a	0.54 ± 0.04 a	16.03 ± 0.82 ab	0.42 ± 0.02 a	63.48 ± 3.09 ab	1.71± 0.21 a	2.68 ± 0.28 a	T3
21.61 ± 0.26 a	0.54 ± 0.01 a	12.75 ± 1.30 b	0.32 ± 0.03 b	65.62 ± 1.79 a	1.66± 0.06 a	2.54± 0.06 a	T4

1. Values represent averages ± standard error

2. Treatments T1, control treatment without adding flax oil, T2, T3, and T4 treatments for adding flax oil at levels (0.06, 0.08, 1)%, respectively.

3. The different letters within one column indicate that there are significant differences between the treatments at the level ($P \leq 0.05$).

The effect of adding different levels of flaxseed oil for Awassi lambs on fat layer thickness and sample muscle area:

Table 4 indicates the effect of adding different levels of flax oil in Awassi sheep on the thickness of the layer to the rib-eye muscle where significant differences were observed ($p \leq 0.05$) where the addition treatments decreased (T2, T3, T4) compared to the control treatment and amounted to (1.27, 1.21, 1.16, 1.13). mm The increase in the thickness of the fat layer in the control treatment (T1) due to the increased deposition of subcutaneous fat, thus gives an indication of an increase in the amount of fat deposited in the carcasses due to the presence of a positive relationship between the thickness of the lipid layer and the fat content in the carcasses (19).As for the characteristic of the sample muscle area, it was noted that there were significant differences (p 0.05) between the addition factors and the control treatment, where the third and fourth treatments (T3, T4) excelled on the control treatment and the second treatment and reached (12.96, 12.98, 10.81, 9.11) cm^2 and the reason for the increase is the muscle area is due to an increase in the weight of the hot carcass and the empty body (2), and the results agreed with all (21), (3), and did not agree with (1).

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Table (4): The effect of adding different levels of Awassi Lambs flax seed oil and the rib-eye muscle area on the thickness of the fat layer

rib-eye muscle(cm^2)	thickness of fat layer(mm)	traits / treatment
9.11±0.08 c	1.27 ± 0.01 a	T1
10.81±0.26 b	1.21±0.02 b	T2
12.96±0.28 a	1.16±0.02 b	T3
12.98±0.13 a	1.13±0.02 b	T4

Values represent averages ± standard error

2. Treatments T1, control treatment without adding flax oil, T2, T3, and T4 treatments for adding flax oil at levels (0.06, 0.08, 1)%, respectively.

3. The different letters within one column indicate that there are significant differences between the treatments at the level (P≤0.05).

Conclusions:

According to the results of the experiment using nutritional supplements from flaxseed oil, a significantly excelled ($p \leq 0.05$) was obtained in the final live animal weight of the treatments added to it with flaxseed oil compared with the control treatment, Also, an improvement in the carcasses' hot weight, an empty body, an increase in the rib-eye muscle area , a decrease in the thickness of the fat layer, an increase in the percentage of meat compared to the percentage of fat during the physical dissection of the thigh cut.

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