Effect of Vasectomy and / or Adding *Cuminum cyminum* Seeds in the diet of Awassi Ram Lambs on their Carcasses Traits

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Summary

This experiment was carried out at Animal Farm, College of Veterinary Medicine, Baghdad University, from Mar. up to Sept. 2010. Twenty eight Awassi ram lambs of 4-5 months old were equally divided into four groups of similar body weight and fed 2% of concentrate diet of body weight with grazing for 3-4 hours a day. The first group (C) and the third group (V) were fed concentrate diet free of cumin seeds; while the second group (CU) and the fourth group (CV) were fed the same amount of concentrate diet contain 3% of cumin seeds. All animals were grazed daily for 3-4 hours as one group. The third and the fourth groups were vasectomized by close vasectomy operation at the beginning of the experiment. The results revealed that cumin seeds used as feed additives for Awassi ram lambs caused significant ($P<0.05$) increase in live animal body weight, fasting and empty body weight, hot and cold carcass weights also it had an effect on carcass measurements, empty digestive and stomach weight, most carcass joints weight, rib eye muscle area, *Longismus dorsi* weight, lean and fat weight in the rack joint as compared with the control group. However vasectomy had significant ($P<0.05$) increase in the body weight, fasting, empty and hot and cold carcass weight, the weight of pelt, full and empty digestive system, most of joint weights, fat tail, fat weight of the rack joint, while the 4th group showed higher values than the most carcass traits compared with the 2nd and 3rd groups and significantly ($P<0.05$) higher than the control group (1st group). It is concluded that vasectomy and cumin seeds have positive effect on lamb performance and carcass traits. Cumin seeds can be used as effective and cheep feed additives. Further studies are required to prove the suitable ratio of cumin seeds addition alongside with castration in other farm animals.

Keywords: Cumin, Vasectomy, Awassi, lambs, Carcass traits.

Introduction

Live body weight is an actual index for carcass weight and subsequent dressing percentage (1). However, carcass compositions determine the meat yield and meat sensorial traits. Hence the carcass economic value should be based on its compositions. Some authors (2 and 3) found that a proportional carcass weight increase with body weight. Significant correlation coefficients among carcass measurements and the weight of the carcasses and body weight were reported (4 and 5). The researchers (6 - 9) established that feed additive in the diet cause an improving in carcass traits and weights. It was found that castrated bulls fed for 141 days had greater fat thickness at the 12th rib, higher marbling score, meat of acceptable color and finer texture than those non-castrated bulls (10). Vasectomy achieves infertility but does not alter the ability or desire of male to mate (11). Nethertheless, no information is available on the effect of cumin seeds used as feed additives and vasectomy on carcass traits and measurements of lambs. Therefore, this study aimed at finding out the effect of using cumin seeds (3%) in the diet as feed additives and/or vasectomy on carcass traits of Awassi ram lambs.

Materials and Methods

This experiment was conducted at Animal Farm, College of Veterinary Medicine, Baghdad University from March up to September 2010. Twenty eight healthy Awassi ram lambs of 4-5 months old and body weights of 20-22 kg were bought apparently from local market. They were kept for 4 weeks in semi open yard and were fed on a concentrate diet (2% of body weight) and grazed for 3-4 hours/day on College Fields as preliminary period. Lambs were divided randomly (7 each) into four groups having equal body weight. All animals were clinically examined, treated and

vaccinated before the initiation of the experiment.

The design of the work goes as follow: The first group (C) was daily fed on 2% of body weight concentrates/ head and was kept as control group. The second group (CU) was daily fed on the same amount of the same concentrate diet contain 3% cumin seeds per a head. The third group (V) was consisted of vasectomized rams and daily were fed on 2% of body weight as in the control group. The fourth group (CV) consisted of vasectomized rams and were daily fed on the same diet and amount of the 2nd group. All animals were grazed daily for 3-4 hours daily as one group. In addition, hay and green roughages were freely offered when the animals were indoor. Clean tap water and mineral blocks were available *ad lib*. At the end of the trail five animals of each group were randomly selected and fastened for 24 hours before slaughtering. Weights of hot carcasses and hot dressing percentages were calculated. Carcass width and depth at the 5th rib were measured. The weights of all organs or parts were recorded. The empty body weights were
calculated including kidneys and kidney fat. The carcasses were kept in a refrigerator for 24 hours for cooling. Cold carcasses weights and their percentages were taken, and then the carcasses were dissected equally into two halves (left and right). Carcasses lengths of the left side (from the first rib up to the itch bone) were taken. The left sides were further portioned into joints (cuts) and the weights of the joints were reported. The rib eye muscle areas at the 12th rib of the rack joints were measured. Rack joints were dissected into lean (*Longissmus dorsi* muscle plus other lean), fat and bone tissues with cartilage were recorded and their percentages were calculated (2 and 9).

Data were analyzed using complete randomized design (CRD) and least significant differences (LSD) were applied to detect the significant differences among different group means at 5% level. Correlation coefficients among some carcass traits were calculated according to (12).

Results and Discussion

The mean live body weight and fasting body weight at slaughter of all groups were 38.43±1.33 and 37.15±1.05 kg respectively. However all treated groups weights were significantly (P<0.05) heavier than those of the control group (Table, 1). Hot and cold carcass weights and left and right halves cold weight showed similar trend as in the live weight and fasting body weight. The fourth group showed higher values in all traits mentioned as compared with 2nd and 3rd groups.

Table, 1: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on the live body weights, empty body weight, hot & cold carcass weight & their halves (Kg) of Awassi male lambs (Mean±SE)

Trait	Treatment				LSD
	C	CU	V	CV	
Live body wt (Kg)	32.10±1.41 c	40.70±1.04 ab	37.90±1.17 B	43.00±1.64 a	4.09
Fasting body wt (Kg)	30.90±1.25 c	39.50±1.03 ab	37.00±1.04 b	41.20±1.59 a	3.66
Empty body wt (Kg)	26.40±1.02 c	34.75±0.81 a	31.74±1.07 b	35.62±1.09 a	3.01
Hot carcass wt (Kg)	14.55±0.61 c	19.30±0.53 ab	17.36±0.62 b	20.10±0.89 a	2.03
Cold carcass wt (Kg)	14.18±0.65 c	18.90±0.55 ab	16.98±0.58 b	19.62±0.89 a	2.04
Left half cold wt (Kg)	7.06±0.34 c	9.32±0.27 ab	8.30±0.28 b	9.66±0.54 a	1.12
Right half cold wt (Kg)	7.05±0.34 c	9.58±0.38 ab	8.66±0.36 b	9.98±0.51 a	1.21

Different letters showed significant difference among treatments at 5% level.

No significant differences existed among different groups. Values of the full and empty hot and cold dressing percentages were higher in the second and fourth groups than in the control and third groups (Table, 2). The second and third groups showed significantly (P<0.05) higher values in their carcass depth compared with control group. Also carcass of all treated groups showed significantly (P<0.05) higher values than the control groups, but no differences were established in carcass length among different groups (Table, 3).

Table, 2: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on dressing percentages % of Awassi male lambs (Means ± SE)

Trait	Treatment				
	C	CU	V	CV	LSD
Full hot dressing %	47.10±0.53	48.90±1.24	46.93±1.25	48.75±0.58	-
Empty hot dressing %	55.81±0.21	55.58±1.35	54.79±1.83	56.33±0.87	-
Full cold dressing %	45.87±0.60	47.87±1.17	45.94±1.45	47.58±0.58	-
Empty cold dressing %	53.60±0.47	54.41±1.29	53.65±2.10	54.98±0.91	-

Table, 3: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on carcass measurements (cm) of Awassi male lambs (Mean ± SE).

Trait	Treatment				
	Control	CU	V	CV	LSD
Carcass length	59.80±1.16	64.80±1.39	62.60±1.63	65.40±1.54	-
Carcass depth	28.80±1.39 b	32.40±0.81 a	30.60±0.66 ab	32.0±0.32 a	2.62
Carcass width	22.0±0.55 b	25.80±0.92 a	25.20±0.97 a	25.40±1.12 a	2.74

Different small letters showed a significant difference among treatments at 5% level.

The gain in the body weight of all groups during the experimental period indicated that the animals were at growth stage. These results were in agreement with those of previous studies carried out by (6, 8, 9, 13 and 14) who reported that the ram lambs continue in growth up to puberty. The treated groups showed significantly ($P < 0.05$) higher live weight, fasting weight, empty body weight and hot and cold carcass weight than those of the control group. Such increase could be mainly attributed to the effect of cumin seeds and partially to the consequence vasectomy. Cumin seeds contain high levels of protein, vitamins (A, E, K, C and B complex) and minerals (Ca, P, K, Fe, Mg, Na, and Z) (15). Moreover in additional to its components of essential oil as α pinene, 1, 8 cineole, linalole and limonene. However, cumin seeds are rich in vitamin E, acting as antioxidant substances having free radicals (16). Some workers confirmed that extract of cumin seeds have strong antioxidant activity which indicated that their intake may be beneficial as feed additives (17). Additionally, cumin seeds contain flavonoids which have antioxidant activity (18). It follows that cumin seeds oil contains high percentage (85%) of unsaturated fatty acids which is resemble to the vegetable oil (19). Also cumin seeds can serve as appetizer, hypoglycemic (20 - 22). Many workers found that cumin supplement in a diet may cause an improvement of feed conversion efficiency of rabbits (23). However, vasectomy achieves infertility, but does not alter the ability or desire of male to mate (11 and 24). Many workers found that vasectomy had no significant alterations in the levels of serum of ICSH (LH) and SSH (FSH) or testosterone (25 and 26).

It is suggested that synergistic effects may be obtained using cumin with vasectomy reflected by better final weight of live animals, fasting and empty body weight and hot and cold carcass weights. Notably, an increase in live body weight at slaughter has subsequent positive effect on hot and cold carcass weight. It is known that the correlation coefficient between live body weights prior to slaughter was highly significant ($P<0.01$) with hot (0.951) and cold (0.944) carcass weight. These finding were similar to study conducted by other workers (3, 4 and 27). On the contrary many workers found that live body weight at slaughter, fasting weight and hot and cold carcass weight significantly differed using other kinds of feed additives and applied various feed regimes (6, 8 and 9). Similarly (6 and 8) found that feed additives in the diet caused significant increase in dressing percentages. Also the current results were in accordance with those found by El-Bedway (28), using certain feed additives. In the mean time (29) and (4) confirmed a concurred

increase of dressing percentages with body weight at slaughter. Golian et. al. (30) found that there was a significant increase in body performance of carcass traits during growing period with supplementation of cumin seeds. Also (31) noticed that castrated bulls yielded lower dressing percentage as compared with the control group. In the context, carcass measurements (depth and width) showed similar trends as body weight and hot and cold carcass weights. Which were obtained by many workers (6, 8 and 9). Al-Jassim, (4) Established significant correlation coefficients among carcass measurements and the live body weight and carcass weights. The current findings were in accordance with those of the later workers. In general, no significant differences were recorded in the carcass weight of different parts or organs of different groups except the mesenteric fat (Table, 4). The treated groups had significantly (P<0.05) higher weight than that of control group.

Table, 4: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on the weights of edible parts or organs (g) of Awassi male lambs (Mean±SE)

Trait	Treatment				
	C	CU	V	CV	LSD
Liver	562.00±25.32	661.80±55.5	558.20±62.62	703.40±44.01	-
Heart	157.20 ±15.0	169.80±17.22	167.20±10.25	211.40±10.44	-
Lungs	406.00±42.79	516.40±23.22	546.00±115.11	497.60±20.60	-
Kidneys	78.00±9.26	104.20±5.64	84.00±10.40	104.20±6.34	-
Spleen	60.40±12.14	64.80±6.07	54.50±7.05	61.80±8.38	-
Kidney fat	135.80±26.51	177.00±17.90	197.60±29.07	212.40±16.67	-
Mesenteric (caudal) fat	178.40±42.07 b	313.80±32.34 a	336.00±55.64 a	394.80±34.98 A	126.63

Different letters showed significant difference among treatments at 5% level.

The edible parts or organs weight of all groups showed no differences except caudal fat. The treated groups established significantly (P<0.05) higher edible weights than those of the control group. Consequently the cumin seeds fed as feed additives and/ or vasectomy had no effect on all edible parts or organs weights. Similarly (2) found no significant differences in edible organs or parts according to level of feeding except the kidney fat and caudal fat, which proportionate with concentrate diet level. Many researchers confirmed that the edible organs ratios decreased with age progress with subsequent increase in the body weights of lambs and kids (1, 6, 8, and 32). Al-Saady (9) showed significant differences in most edible parts or organs weights using *Nigella sativa* and / or *Fenugreek* seeds in the diet of Awassi ram lambs. The control group showed significantly (P<0.05) the lowest weight in their pelt, limbs, full and empty digestive system and the stomach compartment compared with all treated groups (Table, 5). However, no differences were recorded in the weight of head and intestine between control and treated groups.

Table, 5: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on the weights of inedible parts or organs (Kg) of Awassi male lambs (Mean±SE).

Trait	Treatment				
	C	CU	V	CV	LSD
Head	2.34±0.19	2.79±0.15	2.46±0.16	2.88±0.06	-
Pelt	3.25±0.11 b	3.95±0.12 a	3.93±0.22 a	4.16±0.10 a	0.44
Limbs	1.00 ±0.00 b	1.00±0.00 b	1.16±0.09 ab	1.30±0.12 a	0.23
Full digestive system	7.30±0.44 b	8.30±0.30 ab	8.60±0.25 a	9.20±0.60 a	1.26
Empty digestive system	2.60±0.28 b	3.55±0.16 a	3.34±0.28 a	2.62±0.12 a	0.66
Stomach Compartments	1.15±0.10 b	1.73±0.11 a	1.52±0.21 ab	1.64±0.11 a	0.42
Intestine	1.45±0.23	1.82±0.11	1.82±0.11	1.98±0.02	-

Different letters showed significant difference among treatments at 5% level.

The most inedible parts or organs weights of treated groups (except the head and intestine) were higher than those of the control group. Also (2) showed significant differences in the weights of head and pelt following different feeding regimes. However, (8) couldn't find any difference in the weights of inedible organs or parts applying parsley seeds additive to the diet with or without vitamin E. Other workers (6 and 9) explained that feed additives caused significantly positive effect in most inedible parts or organs weights of Awassi lambs. While (30) revealed that the weight of gastrointestinal tract of broiler those fed cumin seeds did not differ from those of the control group. However, (4) found an adverse proportion between the head, pelt and feet percentages with live body weight. The weight of fat tail of the fourth group was significantly (P<0.05) higher than those of first and second groups. Also the 3rd and 4th groups had significantly (P<0.05) higher values than those of the first group (Table, 6). The leg and shoulder joints weight of fourth and second groups exhibited significantly (P<0.05) higher values than those of third and first groups. The loin and rack joints of second group showed significantly (P<0.05) higher than those of third and first groups. However, the flank, breast and neck joints of the treated groups showed higher values than their counterparts of the control group.

Table, 6: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on the weights of carcass parts (g) of Awassi male lambs (Mean±SE).

Trait	Treatment				LSD
	C	CU	V	CV	
Eye muscle area (mm)	1180.0±73.5 b	1524.0±112.8 a	1160.0±40.0 b	1180.0±40.0 b	291.2
Longissmus dorsi wt (g)	124.6±9.1 b	167.6±5.20 a	141.2±9.3 b	146.4±9.7 ab	25.6
Longissmus dorsi %	23.4±1.4	21.8±1.2	23.4±1.4	20.9±1.1	-
Lean wt (g)	271.8±28.7 b	429.2±28.1 a	268.0±26.2 b	335.6±39.9 b	93.5
Fat wt	96.4±19.3 c	146.8±4.2 b	170.6±14.7 ab	191.2± 8.6 a	39.1
Bone wt (g)	169.6±6.7	201.6± 15.1	166.2±11.2	183.6±20.0	-
Lean %	50.3±2.7 ab	55.1±0.6 a	44.1±1.9 c	47.0±2.3 bc	6.5
Fat %	17.6±3.1 b	19.1±0.8 b	28.5±2.6 a	27.4±1.3 a	4.4
Bone %	32.1±2.0 a	25.9±0.8 b	27.6±1.5 b	25.9±1.7 b	7.21

Different letters showed significant difference among treatments at 5% level.

The weights of all joints except the fore shank of the treated groups were significantly higher than those of the control group, which were similar to the results of many workers in the most joints weight using other different feed additives homology (6-9). This homology could be partly due to the weight of the whole carcasses. However, (30) stressed that the weights of broiler chicken leg and breast fed cumin seeds as feed additives were not affected compared with the control group. Giali and Taher (33 and 36) reported that about one third of the total fat of Awassi sheep was confined in the tail which contributed nothing to the carcass yield. However, (4) showed that loin joint increased with an increase of carcass weight.The overall mean of the rib eye muscle area of all groups was 1341.0 ± 60.1 mm. The second and the fourth groups had significantly (P<0.05) higher values than those of the first and third groups (Table, 7). The *Longissmus dorsi* weight of the second group showed significantly (P<0.05) higher value than those of the first and third groups. However, the total weight of lean in the rack joint of the second group significantly (p<0.05) recorded higher than all other groups. Also, the fat weight of rack joint of all treated groups was significantly (P< 0.05) higher than that of the control group, but no differences were reported in bone weight among different groups. The lean percentage of the second group showed significantly (P<0.05) higher than those of the third and fourth groups; similarly the control group had significantly (P<0.05) higher value than the third group. In contrast the fat percentages of the third and fourth groups recorded significantly (P<0.05) higher values than those of the first and second groups, while the bone percentages of the control group were significantly (P<0.05) higher than those of all groups in their counterparts.

Table, 7: Effects of vasectomy and/or adding *Cuminum cyminum* in the diet on the weights & the ratio of the rib region component of Awassi male lambs (Mean±SE).

Trait	Treatment				
	C	CU	V	CV	LSD
Fat tail	550.89±77.19 c	806.26±30.8 b	973.2±78.4 ab	1175.0±163.7 a	299.2
Leg	2235.0±140.4 b	2826.0± 69.5 a	2465.0±96.1 b	2830.0±99.8 a	313.5
Loin	629.0± 58.7 b	903.2±104.1 a	624.8±45.3 b	778.6±52.1 ab	207.0
Rack	537.4±42.7 c	777.2±45.3 a	603.8±40.0 bc	709.8±61.35 ab	144.1
Flank	266.4±22.1 b	356.6±25.4 a	422.8±29.8 a	3907.8±38.3 a	88.51
Breast	565.6±50.14 b	667.2±51.4 ab	714.4±28.4 a	788.4±58.13 a	144.9
Shoulder	1447.4±85.4 b	1923.2±92.8 a	1521.0±64.2 b	1882.0±109.47 a	268.2
Neck	514.8±51.4 c	701.6±26.1 ab	613.0±18.6 bc	780.2±51.3 a	118.9
Fore shank	289.4±11.9	361.2±28.1	353.2±21.6	365.4±14.4	-

Different letters showed significant difference among treatments at 5% level.

The rib eye muscle area of the second and fourth groups showed significantly (P<0.05) higher values than those of the third and first groups. This condition could be rather as a result of an increase in the muscle anabolism due to effect of cumin seeds feeding, and its high contents as proteins, vitamins and minerals of good quality which improved feed conversion efficiency and appetite. However, other workers (6-9) proved the same trend using certain feed additives. The *Longissums dorsi* muscle and total lean weights of the rack joint of second group were significantly heavier than those of the first and third groups, such increase could correspond to the better activity of the muscle anabolism due to the effect of cumin seeds feeding. The current results were similar to studies conducted by (6-9) using other feed additives. In a related study castrated bulls had higher value in *Longissmus dorsi* and semitendenosis muscles indicating that castrated group had more tender muscle than luteinizing hormone treated and non-castrated groups (13), with no differences in quality and lean color. In contrast, the fat weight and its ratio of third and fourth groups recorded higher than those of second and first groups, which be attributed to the sequels of leading to fat deposition. Other researchers found that castrated bulls had greater fat thickness of the 12th rib, higher marbling score, meat of acceptable color and finer texture than those of non-castrated bulls (10). However, the non-significant differences in the bone weight of different groups could be ascribed to a hypothesis that bone is an early growing tissue (34). Conversely the high weight of bone in rack joint could be related to the low whole carcass weight. In the meantime some researchers showed that muscle percentages increased in the whole carcass joints corresponding body weight growth. It follows that subsequent increase of body weight of late mature sheep may be accompanied by an increase in fat and decrease in bone percentage (34 and 35). Tahir et al. (32) concluded that castration had no effect on the percentages of lean, fat and bone in major cuts of castrated local black goat. However, there were high (P<0.05) significant correlations between rack joint weight and its component (lean, fat and bone) with animal weight and hot and cold carcass weight. Such association proves that when animals grow and the carcass weight increases, all its components will be increased. Then the current results were in agreement with those noticed by (3, 35 and 36) who confirmed such findings.

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تاثير قطع الاسهر او / و اضافه حبوب الكمون *Cuminum cyminum* في العليقة في صفات ذبائح الحملان الذكور العواسية

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الخلاصة

أجريت هذه التجربة في الحقل الحيواني التابع لكلية الطب البيطري ، جامعة بغداد ، في الفترة من اذار لغاية ايلول 2010. تم تقسيم ثمانية وعشرين حمل عواسي بعمر 4-5 اشهر وقسمت بالتساوي إلى أربع مجموعات وتم تغذية الحملان على العلف المركز (2 ٪ من وزن الجسم) مع الرعي لمدة 3-4 ساعات في اليوم. المجموعة الأولى (C) و المجموعة الثالثة (V) تم تغذيتها على علف مركز خال من حبوب الكمون، بينما تم تغذية المجموعة الثانية (CU) و المجموعة الرابعة (CV) على نفس النسبة من العلف المركز والذي يحتوي على 3 ٪ من حبوب الكمون . أن مجموعة (V) و (CV) أجريت لهم عملية خصي عن طريق قطع الاسهر بالطريقة المغلقة في بداية التجربة. أظهرت النتائج أن حبوب الكمون المستخدمة كإضافات علفية في الحملان العواسيه ادت الى زيادة معنوية ($P<0.05$) في وزن الجسم الحي ووزن الجسم الفارغ، واوزان الذبيحه الحار و البارد أيضا كان لها تأثير في قياسات الذبيحة، ووزن الجهاز الهضمي الفارغ , ووزن معظم قطعيات الذبيحة، ومساحه العضلة العينية ووزنها، ووزن اللحم والدهون في قطعية الاضلاع مقارنة مع مجموعة السيطرة . ومع ذلك كان لقطع قناة الاسهر زيادة معنوية ($P<0.05$) في وزن الجسم ، ووزن الجسم الفارغ ووزن الذبيحة الحارة والباردة، والجهاز الهضمي الكامل و الفارغ، ومعظم أوزان القطعيات ووزن الالية والخاصره ، في حين أظهرت مجموعة (CV) قيم أعلى معنويا ($P<0.05$) في معظم صفات الذبيحة مقارنة مع مجموعتي الكمون (CU) و قطع الاسهر(V) مقارنة مع مجموعة السيطرة .

الكلمات المفتاحية: حبوب الكمون, قطع الاسهر, حملان العواسي, مواصفات الذبيحة.