Proximate composition of meat from cut-up parts of rabbits fed diets containing graded levels of processed tallow seed meal

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Abstract - Eighty one weaned rabbits were randomly allotted to nine groups with nine rabbits to determine Proximate composition of meat from cut-up parts of rabbits fed diets containing graded levels of processed tallow seed meal. Each group had three replicates with three rabbits in a 3^2x 3^5 factorial and arranged as a completely randomized design. Control had 100% palm kernel cake and 0% tallow seed meal. Diets 1 – 4 contained cooked tallow seed meal included at 75% PKC: 25% CTSM, 50% PKC: 50% CTSM, 25% PKC:75% CTSM and 0% PKC: 100% CTSM, Groups 5 – 8 had fermented tallow seed meal diets and included at the same levels as in the cooked diets. Fifty four rabbits were slaughtered from the nine groups with six rabbits per group. Proximate compositions of rabbit's meat from the hindleg, shoulder, rib and loins were determined for MC, CP and EE. Processing methods influenced (P<0.05) hind leg (CP, EE), rib (MC, CP, EE) and loin (CP). Hindleg (MC, CP, EE), shoulder (MC, EE), rib (MC, CP, EE) and loin (CP) values were influenced (P<0.05) by the inclusions levels. It was concluded that rabbit's meat fed processed tallow seed meal had high nutritional value, irrespective of processing methods.

I INTRODUCTION

Recently, the nutritional value of rabbit meat has been reviewed by several authors [1, 2, 3], showing that rabbit meat has a high nutritional value compared with other meats. The main components of meat excluding water are proteins and lipids. Rabbit meat is a lean meat rich in proteins of a high biological value and it is characterized by high levels of essential amino acids [1]. The information available on chemical composition of rabbit meat is extremely variable, especially regarding fat content, depending on the part of the carcass studied [4] and also on the different productive factors [5], especially feeding factors having a strong influence on the chemical composition of rabbit meat, in particular, on its lipid composition. Rabbit meat is characterized by its lower energy value compared with red meats [1] due to its low fat content. Fat content varies widely depending on the carcass portion from 0.6 to 14.4 % (fat from edible meat with intramuscular and intermuscular fat content) with an average value of 6.8 % [3] with the loin being the leanest part of the carcass (1.2 % of lipids).

II MATERIALS AND METHODS

An eighty four days experiment was conducted using eighty one (81) weaned rabbits of mixed breed and sexes to determine the proximate composition of meat from various cut-up parts of rabbits (O*ryctolagus cunniculus*) fed diets containing graded levels of processed tallow (*Detarium microcarpum*) seed meal. The rabbits were randomly allotted to nine treatment groups with nine rabbits per treatment. Each treatment had three replicates with three rabbits per replicate. Two processing methods (Cooking and Fermentation) were used to process tallow seeds. Control diet had 100% palm kernel cake (PKC) meal and 0% tallow seed meal, represented as T_0. $T_1 – T_4$ contained cooked tallow seed meal (CTSM) and included as T_1 (75% PKC : 25% CTSM); T_2 (50% PKC : 50% CTSM); T_3 (25% PKC : 75% CTSM) and T_4 (0% PKC : 100% CTSM), While $T_5 – T_8$ had fermented tallow seed meal (FTSM) and included at the same levels as observed in the cooked diets (Table 1). The rabbits were placed in three-tier rabbit hutches which had a total of nine units per tier. The rabbits were provided with feed and water *ad-libitum* twice daily at 0800 and 1400h for the 84 days experimental period. The rabbits were dewormed against endo and ecto-parasites using 10 mg/ml ivomectine(^{R} Pantex Holland). In addition, medication was administered when necessary. The diets were supplemented with equal quantities of forages (*Tridax precumbens).* The rabbits were weighed at the beginning of the experiment and subsequently on weekly basis. The design of the experiment was a 3^2x 3^5 factorial and arranged as a completely randomized design (CRD). Data on Proximate compositions of rabbit's meat from the hindleg, shoulder, rib and loins were determined for

moisture (MC), crude protein (CP) and ether extract (EE) were determined according to [6]. Data obtained from the experiment were subjected to the analysis of variance (ANOVA) in a completely randomized design using the procedure of [7].

All diets were supplemented with equal amounts of bone meals, oyster shell, salt, vitamin-mineral premix, methionine and lysine. The rabbits were dewormed against endoparasites. Adequate medications were administered where necessary. The diets were supplemented with some quantities of *Tridax procumbens* as source of forage in the evenings. The cages were equipped with feeders and drinkers. Prior to the start of the experiment, the animals were fed common diets and allowed an adjustment period of 5 days to enable the animals get accustomed to their cages and diets. The diets and fresh water were provided *ad-libitum* throughout the duration of the experimental period. The experiment lasted for 12 weeks. At the end of the growth studies a total of 54 rabbits were randomly selected from the nine (9) dietary groups, with six (6) rabbits per group and the carcasses were cut into primal parts. The design of the experiment was 3^2x 3^5 factorial and arranged as a completely randomized design (CRD)

III RESULTS AND DISCUSSION

The proximate composition of meat from various cut-up parts of rabbits fed diets containing graded levels of processed tallow seed meal are shown in Table 2. The processing method had no significant ($P>0.05$) effect on the moisture content of the hind legs, shoulder MC, CP and EE and the loin MC and EE of rabbits. However, the processing methods were found to have influenced the hind leg (CP, EE), rib (MC, CP, EE) and loin (CP) significantly ($P<0.05$). The chemical composition of the leg (MC, CP, EE), shoulder (MC, EE), rib (MC, CP, EE) and Loin (CP) were significantly ($P<0.05$) influenced by the levels of inclusions of tallow in the diets. The hind leg MC was higher at 0 % although similar to those fed at 25 % and 100 % levels, but differed ($P<0.05$) from the rabbits fed at 50 % inclusion level. The highest CP was at 75 % level, while the least was observed at 100 % inclusion level. The shoulder MC was higher at 25 % level although similar to 50 % level. Shoulder EE was lower ($P<0.05$) at 0 % level. Rib MC was higher at 0 % although similar to 25, 50 and 100 % levels but differed ($P<0.05$) from the 75 % inclusion level of the processed tallow diets. The CP of rabbits fed 75 % TSM level was the highest, but differed ($P<0.05$) significantly from those fed at 0 % level which was least, while the EE also followed the same trend as the CP. The Loin CP was higher ($P<0.05$) at 50 % level than at 100 % inclusion level.

There were interactions between processing methods and levels of inclusion of TSM in the hind-leg MC, CP and EE; Shoulder EE; Rib CP, EE and Loin CP. These might be as a result of genotype, age and sex of rabbits. However the values are in line with the 66.60 % recorded by [4]. The crude protein in this study compared well with the per cent protein 21.24 % and 3.74 to 12.32 % fat reported by [8, 9, 4]. The fat content is as a result of manipulation in nutrition for domesticated rabbits [9]. The authors observed that the wild hare solely survive on herbs which might have been responsible for the higher per cent fat normally observed with the domesticated rabbits. The diets did not influence the moisture, crude protein and fat per cent of the shoulder cut up parts as they were not significantly ($P>0.05$) different. The rib moisture content was also in line with the reported values by [4], although the ether extracts were lower than the (12.80 %) reported by the same authors. The loin values were not appreciably influenced by the diets except the per cent crude protein which were slightly different. The values were slightly higher than the 22.10 % reported by [4]. This result is in agreement with the findings of [10, 11] who studied the effects of genotype, age and sex on the muscle composition. The data concerning the protein content of rabbit's meat as related to age are in conformity with the observations of [12] which demonstrated an increase and that of [13] who stated a decrease of the protein content with the increasing age. The contents of the lipids in this present study were within the range of 0.60-14.40 as reported by [5].

IV CONCLUSION

It was concluded that processing methods improved the nutritional content of meat from rabbit's cut-up parts. The CP contents were higher at 75 % levels in all the cut-up parts measured except in the loins. EE were also within the normal ranges. Therefore meat from rabbits fed tallow seed meal based diets had

high nutritional quality.

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Table: 1 Composition of experimental diets (%)

Ingredients	Control	CTSM				FTSM			
	0	25	50	75	100	25	50	75	100
Maize	17.69	23.48	27.13	32.20	35.18	24.76	30.31	33.95	37.75
PKC	58.06	39.20	24.31	10.89	0.00	38.24	22.72	10.45	0.00
TSM	0.00	13.07	24.31	32.66	40.57	12.75	22.72	31.35	38.00
Maize offal	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Salt	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Vita premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Bone meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Methionine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100	100
Determined analysis									
Dry matter	88.47	87.50	89.05	87.95	87.88	88.89	88.69	89.13	87.85
Crude protein	16.85	16.48	16.20	16.65	16.00	16.55	16.20	16.85	16.00
Crude fibre	15.62	16.12	16.50	15.50	15.50	15.50	16.60	16.03	16.03
Ash	4.50	4.50	4.50	4.00	4.00	4.00	4.50	5.00	5.50
Ether extract	9.00	11.00	11.00	10.50	9.50	10.50	9.00	9.00	9.50
NFE	42.50	39.40	40.85	41.30	42.88	42.34	42.39	42.25	40.82
Energy (Kcal/kg/ME)	2756	2840	2864	2941	2891	2842	2846	2615	2749

TSM = Tallow seed meal, CTSM= Cooked tallow seed meal, FTSM = Fermented tallow seed meal

Premix supplied per 2.5kg/tonne contains: Retinol acetate (10000000 iu), Vit. D_3 (2000000 iu), Vit E (15000 iu), Vit B (3000mg),Niacin (15000mg),

Calcium pantothenate (800mg), Vit . B_6 (3000mg), Vit. B_{12} (10mg) Vit. K_3 (2000mg), Biotin (20gm),

Folic acid (500mg), Choline chloride (250,000mg), Manganese (75000mg), Iron (25000mg), Copper (5000mg), Zinc (70000mg), Selenium(150mg), Iodine(1300mg), Magnesium (100mg), 500g ethoxyquin and BHT (700g)

NFE=Nitrogen free extract.

Table 2: Chemical composition of meat from hind leg, shoulder, rib and loin of rabbits fed diets containing graded levels of processed tallow seed meal (TSM) (%)

Methods	Hind leg			Shoulder			Rib			Loin		
	MC	CP	EE	MC	CP	EE	MC	CP	EE	MC	CP	EE
Cooked	65.25	24.21^{a}	6.83^{b}	64.71	25.15	5.13	66.01^{a}	20.58^{b}	9.76^{b}	66.06	23.12^{b}	6.61
Fermented	65.20	23.15^{b}	8.72^{a}	64.72	25.15	5.12	65.02^{b}	22.12^{a}	10.48^{a}	65.90	23.33^{a}	6.74
SE	0.019	0.010	0.036	0.014	0.019	0.002	0.046	0.082	0.019	0.027	0.001	0.014
LOS	NS	*	*	NS	NS	NS	*	*	*	NS	*	NS
Levels												
0	65.68^{a}	24.23^{a}	6.81^{c}	64.36^{c}	25.24	5.08^{b}	65.88^{a}	19.80^{c}	9.77^{c}	66.09	23.14^{b}	6.50
25	65.34^{ab}	24.24^{a}	6.87^{c}	64.99^{a}	25.22	5.14^{a}	65.68^{a}	21.53^{ab}	9.85^{c}	65.67	23.35^{a}	6.72
50	64.65^{c}	23.86^{b}	8.22^{b}	64.80^{ab}	25.22	5.13^{a}	65.63^{ab}	21.61^{ab}	10.03^{bc}	66.15	23.60^{a}	6.77
75	65.07^{b}	25.83^{a}	7.43^{c}	64.69^{b}	25.03	5.13^{a}	64.79^{b}	22.77^{a}	10.60^{a}	66.06	23.16^{b}	6.66
100	65.39^{ab}	22.24^{c}	9.54^{a}	64.71^{b}	25.03	5.13^{a}	65.59^{ab}	21.06^{bc}	10.35^{ab}	65.95	23.12^{b}	6.73
SE	0.048	0.024	0.091	0.036	0.047	0.006	0.114	0.206	0.047	0.067	0.024	0.035
LOS	*	*	*	*	NS	*	*	*	*	NS	*	NS
M×L	*	*	*	NS	NS	*	NS	*	*	NS	*	NS

^{abc} Means with different superscripts in the same column are significantly ($P<0.05$) different.

SE: Standard error, LOS: level of significance, NS: Not significant, *: Significant

MC= Moisture content CP= Crude protein EE= ether extract, M x L: Interaction between method and level.