THE EFFECT OF USING GROUNDNUT VINES TREATED WITH DIFFERENT LEVELS OF CALCIUM OXIDE ON RUMEN FLUID AND BLOOD PARAMETERS, DIGESTIBILITY AND PRODUCTIVE PERFORMANCE OF SAIDI SHEEP

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SUMMARY

This study aims to evaluate the effect of treating groundnut vines with different levels of calcium oxide on rumen and blood measurements, nutrient digestibility and productive performance of growing saidi lambs. The nutritional treatments were divided into four treatments: the first diet: the control diet: a basic groundnut vines diet without calcium oxide (CaO); The second diet consists of the control diet +1.5% CaO; The third diet consists of the control diet + 3% CaO and the fourth diet consists of the control diet + 4.5% CaO; Twenty-eight lambs from Upper Egypt were used for the four experimental groups (each group of 7 lambs) in a completely randomized design for 180 days. The average initial body weight was 21.75 kg, ±1.52%. The percentage of crude protein in all experimental rations was 13.21%. The results showed that the dry matter intake was increased numerically with increasing in the percentage of calcium oxide, as the fourth group (4.5% CaO) recorded: the highest value for the dry matter intake (1224 g/day) and the lowest value was recorded in the control group (1208 g/day). The best digestion coefficients of all nutrients were showed for the fourth group. while the control group (0%CaO) had the lowest digestive values for all nutrients. The fourth group (4.5%CaO) achieved the highest significant values for both rumen ammonia-nitrogen and volatile fatty acids (32.68 mg/dL and 8.33 meq/dL, respectively) while the lowest values were found for the control group (26.13 mg/dL and 6.33 meq/dL, respectively). All blood parameters were significantly superior for the fourth group, to the control group ($p<0.05$) unless albumin and globulin were non-significant differences between the experimental groups. The fourth group recorded the highest total weight (31.38 kg) and average daily gain (174.33 g/d) while the lowest total weight and average daily gain was recorded for the control group (26.48 kg and 147.11 g/d respectively).

Keywords: *CaO-treated vines, groundnut crop residue, growth performance and rumen parameters.*

INTRODUCTION

Groundnut vines (GV) consist of leaves, stems, and at times leftover pods abandoned in the field after the groundnut is harvested. It is considered an important fodder for small ruminants, especially in growing lambs. It is a popular feed resource in some countries in the West Africa sub-region mostly in the dry season. In The Gambia, groundnut haulm is considered to be the most common traditional feed resource fed to livestock on zero grazing for about nine months of the dry season (Asaolu *et al.,* 2010). In Nigeria, groundnut haulm was identified as a feed for livestock, particularly in the dry season when fresh and green grasses are scarce.

In Egypt the use of GV as feedstuff is limited by bulkiness and high fibre content. Pelleting and calcium oxide (CaO) treatment have been widely used to improve the nutritive quality of high-fibrous and bulky feedstuffs for ruminants. However, information on CaO-treated groundnut vines and pelleted groundnut vines diets for lambs has not been applied or tried before among small farmers on newly reclaimed lands.

Feed costs can be reduced by using dried groundnut vines treated with different levels of CaO in growing saidi lamb's diets. In the current study growing saidi lambs were used to study the impact of

feeding groundnut vines treated with different levels of CaO in a complete diet on growth performance, nutrient digestibility, rumen activity, and blood parameters.

MATERIALS AND METHODS

Groundnut production in the studied areas:

Farmers and Wadi Al-Nuqra in Aswan Governorate in the newly reclaimed lands grow groundnut in order to improve the qualities of sandy soil as well as obtain a quick return compared to the cultivation of sugar cane. Groundnut is grown during the summer season, and this led to the presence of large quantities of groundnut vines after harvest (leaves and stems).

Preparation of treated groundnut vines:

Fresh groundnut vines collected from surrounding fields cultivated groundnut at Al Nokra region, Aswan governorate. Groundnut vines are the residue obtained at the fields after harvesting pods and were prepared simply by sun drying for one week till 10% moisture content was attained. During this period, groundnut vines was turned upside down 4 times a day. Dried, ground, weighed into nylon bags. The grinding groundnut vines (1 mm) was treated by spraying different levels of CaO, (0, 1.5,3 and 4.5%).

Feeding trial and animal management:

A total of 28 growing saidi lambs (initial BW = 21.75 ± 5.0 kg; age = 4 ± 0.63 months) were stratified by weight and randomly allotted to four treatments all groups with seven lambs per treatment; each group was housed in a separate pen in a shady building (open area).

The experimental treatments were prepared as in pelleted form consisting of groundnut vines with different levels of CaO as follows:

T0 (Groundnut vines without CaO treated).

T1.5 (Groundnut vines Plus 1.5% CaO).

T3 (Groundnut vines Plus 3% CaO).

T4.5 (Groundnut vines Plus 4.5% CaO).

The groundnut vines were ground using a 5 hp grinder with 2.5 mm sieve, mixed well, then converted into pellets using a 1 ton per hour pelletizer machine.

Before beginning the feeding trail, the growing saidi lambs were treated for external and internal parasites.

Refusals were removed at the end of each day, weighed, and sampled for DM determination before being discarded. Throughout the experiment, feed consumption data was recorded daily, and lambs were weighed biweekly. The experimental period lasted 180 days.

Digestibility trails:

At the end of the feeding trial, a digestibility trial was conducted with 5 lambs/treatment to determine nutrient digestibility and nutritive value of each experimental diet. The collection period was seven days. Weights of feed offered and ort were recorded daily, sampled, ground to pass through a 2 mm screen, and stored. Feces voided were collected before feeding in the morning, weighed and a 10% aliquot of total feces was dried at 65°C for 24 h. The dried samples of feces were ground through a 2 mm screen and stored for later analyses.

Rumen fluid samples:

Rumen liquor samples were collected from five animals randomly chosen from each group using stomach tube 0 hrs post feeding and filtered through three layers of cheesecloth for estimating of rumen parameters. The pH value was immediately documented using digital pH metter, while samples were stored at -20°C until chemical analysis. Ruminal ammonia nitrogen (NH_3-N) concentration was measured according to (Conway, 1957), Ruminal total volatile fatty acids (TVFA's) concentration was measured by steam distillation procedure according to (Warner, 1964) and total protozol count was estimating according to (Dehorety, 1986).

Blood sampling and analysis:

At the end of the experimental period blood samples were taken from five animals randomly chosen from each group. The blood samples were taken at three hours post morning feeding and left at refrigerator for 15 minutes, then centrifuged at 3000 r.p.m for 25 minutes. Blood serum was separated and stored at -20 c until later analyses. Blood serum was analyzed for total protein (Armstrong and Carr, 1964), albumin (Doumas *et al.*, 1971). AST, ALT (Reitman and Frankel, 1957) and globulin was calculated by difference. Total lipids and cholesterol were determined according to Schalm *et al.* (1975), and glucose was measured according to the procedure outlined by Trinder (1969).

Chemical and statistical analysis:

Samples of experimental diets, feces were analyzed for moisture, crude protein, crude fiber, and ether extract according to AOAC (2007).

Statistical analysis:

Data were analyzed using the general linear models procedure of SAS (2017). Duncan's (1955) multiple range test was used to test for significant differences among means.

RESULTS AND DISCUSSION

Chemical compositions of dried groundnut vines:

The values chemical composition of dried groundnut vines were contained 87.0%, 13.50%,23.0%,2.67% ,46.40% and 7.80% for DM, CP, CF, EE, NFE and ash, respectively. The crud protein value averaged 13.50 % for the four experimental diets. Ahmed and Ballout (1977); Ndlovu and Hoff (1995) reported that the groundnut haulms contains crude protein ranging from 7.4 to 8.8% while Nouala *et al.* (2006) found that the crude value in the groundnut haulms was 12.8%.

The chemical composition of groundnut vines was agreed with those values reported by Hadjipanayiotou (1994 and 1996) and Jassim *et al.* (1997). The high ash content was probably due to the contamination of dried groundnut vines sand during the sun-drying. Chemically, alkaline treatment promotes the breaking of ester bonds between hemicellulose and lignin, resulting in increased porosity and internal cell surface area (Romão *et al.*, 2014). The contents of almost all nutrients were similar in all dietary treatments, but the level of calcium oxide treatment was different (0, 1.5, 3 and 4.5%), respectively.

The values of crude fiber and ether extract in this experiment are consistent with the values found by Asaolu *et al.* (2010) who found that the groundnut haulms contain 23% CF and 2.7% EE. Romao *et al.* (2014) found that when sugar cane was treated by calcium oxide (CaO) levels of 0, 0.75, 1.5, 2.25, 3.0, 3.75 and 4.5%, there was an increase in dry matter and mineral matter. The differences in the chemical composition of groundnuts haulms are due to many factors such as the type of land, harvesting methods, cultivated lands and handling methods (Leng, 1990). Due to the presence of 13.5% crude protein in groundnut haulms, Asaolu *et al.* (2010) recommended that it be used as a sole ration in WAD goats feed.

Feed intake and digestibility:

Feed intake:

The results in Table 1. indicate that the dry matter intake of 4.5%CaO treated dried groundnut vines pelleted diets (1224.36 g/animal/day) was higher than 0%CaO, 1.5%CaO and 3%CaO treatments (1208.78, 1217.44 and 1218.45 g/animal/day, respectively). However, it was not different (p>0.05) among treatments. The same trend was observed with crude protein intake that was not different among different levels of calcium oxide groups (p> 0.05). It was 163.18, 164.35, 164.43 and 165.28 g/animal/day corresponding to 0%CaO, 1.5%CaO and 3%CaO and 4.5%CaO treatments.

Many researchers have noticed an increase in dry matter intake and protein intake with an increase in the proportion of groundnut haulms in sheep and goat diets (Awadalla *et al.* (1997); Prasad *et al.* (2000); Abubakar *et al.* (2005); Abdou *et al.* (2011) and Ososanya (2012). This data agrees with Shreck *et al.* (2014) who reported that the dry matter intake and feed conversion ratio were improved when animals fed on increasing levels from groundnut haulms. Our findings disagree with those of Nuñez *et al.* (2014), who concluded that the addition of CaO led to a linear drop in intake (P = 0.04) and a linear rise in G: F (P = 0.02).

Our data agreement with finding, (Murthy *et al.* (2004) and Finangwai *et al.* (2018)) they found that with an increase in the proportion of groundnut haulms in the diet, did not affect the dry matter intake. Shreck *et al.* (2014) and Nuñez *et al.* (2014), reported that the inclusion of calcium oxide in animal diets increased G: F (P = 0.02).

Table (1): Effect of different levels of calcium oxide supplementation on feed intake of growing saidi lambs.

Feed intake	Experimental rations				
	T0	**T1.5**	**T3**	**T4.5**	**P value**
Dry matter intake (DMI), g/d	1208.78±31.47	1217.44±31.6	1218.45±31.9	1224.36±32.2	0.958
Crude protein intake (CPI), g	163.18	164.35	164.43	165.28	0.981

a,b,c Means in the same row with different superscripts are significantly different (p<0.05)

Nutrient Digestibility:

The nutrient digestibility of experimental growing saidi lambs are shown in Table 2. The nutrient digestibility of DM, OM and CP tended to increase (p<0.05) followed by increasing CaO level. The DM digestibility was 78.8, 80.5, 81.5 and 82.1 % corresponding to 0% CaO, 1.5% CaO, 3% CaO and 4.5% CaO, respectively. Similarly, the crude protein digestibility values were 76.7, 79.6, 78.8 and 80.5 % corresponding to 0% CaO, 1.5% CaO, 3% CaO and 4.5% CaO, respectively.

The calcium oxide treatment elicited similar (P < 0.05) results in the digestibility of all nutrients evaluated. The dry matter digestibility ranged between 78.8% and 82.1% for animals on 0%CaO treated and 4.5% CaO treated diets respectively. In addition, the crude fiber digestibility ranged between 74.28 to 78.15 % for lambs fed 0%CaO treated groundnut vines and 4.5%CaO treated groundnut vines diets respectively.

Improved feed efficiency may result due to the enhanced digestibility of treated groundnut vines. These findings are consistent with a previous study by Hadjipanayiotou (1994), who discovered that in comparison to untreated dried groundnut vines and treated dried groundnut vines with varying CaO levels increased their digestibility values. Furthermore, this result supported the conclusion made by Li *et al.* (2002) that meals including dried groundnut vines treated with varying concentrations of CaO would be more suitable for promoting digestion.

These results are consistent with those of Nuñez *et al.* (2014), who observed that as CaO concentrations increased, apparent NDF digestibility tended to rise (P = 0.07) and ADF digestibility did increase (P = 0.01) linearly. Additionally, they reported that in calves fed 60% DDGS-based diets, the CaO supplementation reduced the metabolic acid load and enhanced the digestibility of fiber. According to Romão *et al.* (2023), the addition of 4.2% calcium oxide (on a fresh matter basis) increased the availability of dry matter to the largest degree while lowering the concentration of lignin and cellulose.

Groundnut haulms supplementation showed a positive linear effect on the digestibility of dry matter, crude protein, crude fiber and ether extract, according to (Narayanswamy *et al.* (1990); Ayantunde *et al.* (2007) and Abdou *et al.* (2011). According to many researchers such as Abubakar *et al.*, (2005); Ososanya (2012); Nuñez *et al.* (2014) and Finangwai *et al.* (2018) when different levels of groundnut haulms or groundnut haulms treated with different levels of calcium oxide were used as supplementation diets, the digestibility coefficients of DM, OM, CP, CF, EE, and ash were higher Significantly (P < 0.05).

Growing saidi lambs on calcium oxide treated dried groundnut vines had achieved higher efficiency of feed conversion than those allotted to the control diet as indicated by the values of feed conversion ratio of 8.21, 7.53, 7.02, and 7.02 kg DMI/ kg growth for animals on CaO-treated dried groundnut vines pelleted diets respectively.These results are consistent with both Narayanswamy *et al.* (1990) and Awadalla *et al.* (1997) who indicated that feed conversion was improved as groundnut haulms was increased in diet rahmani animals.

The values of total digestible nutrients (TDN) of 61.92, 63.03, 64.02, and 64.67 for animals on T0, T1.5, T3 and T4.5, respectively. This data agrees with Prasad *et al.* (2000), who reported that the rations containing 20% groundnut haulms had 62.6% total digestible nutrients and 8.08% digestible crude

protein. Data in Table (2) revealed that the dried groundnut vines treated with the calcium oxide had a significantly ($p<0.05$) higher concentration of total digestible nutrients than the control diet.

This outcome was in line with the research conducted by Abouheif *et al.* (1999), who discovered that diets with higher digestibility coefficients eventually had diets with higher TDN values. Although all of the experimental diets were isonitrogenous, the observed variations in nitrogen consumption were linked to the lambs' corresponding feed intake trends, which are consistent with the earlier research by Abouheif *et al.* (2009).

According to Abdou *et al.* (2011) showed that feed conversion efficiency was positively correlated with groundnut haulms ($P<0.001$). The same trend was observed with both starch value (SV) and digestible crude protein (DCP) with groundnut haulms.

Table (2): Effect of different levels of CaO supplementation on digestion coefficients and nutritional value of growing saidi lambs.

Nutrient digestibility's,%	Experimental rations				P value
	T0	T1.5	T3	T4.5	
DM	$78.8^{b}\pm0.82$	$80.5^{ab}\pm1.40$	$81.5^{a}\pm1.53$	$82.1^{a}\pm1.65$	0.027
OM	$74.16^{b}\pm1.16$	$74.87^{b}\pm1.1$	$75.63^{ab}\pm1.2$	$76.89^{a}\pm2.46$	0.065
CP	$76.7^{b}\pm6.86$	$79.6^{ab}\pm2.80$	$78.8^{b}\pm3.86$	$80.5^{a}\pm3.39$	0.057
CF	$74.28^{b}\pm0.26$	$76.89^{ab}\pm4.24$	$77.35^{a}\pm2.26$	$78.15^{a}\pm1.80$	0.039
EE	$66.63^{b}\pm2.55$	$71.85^{ab}\pm1.46$	$76.52^{a}\pm3.60$	$76.96^{a}\pm2.40$	0.043
NFE	$67.82^{b}\pm2.35$	$69.28^{ab}\pm4.71$	72.04 ± 1.91	72.42 ± 1.34	0.062
FCR	8.21^{c}	7.535^{b}	7.022^{a}	7.023^{a}	0.036
TDN %	$61.92^{c}\pm0.56$	$63.03^{b}\pm1.20$	$64.02^{a}\pm0.94$	$64.67^{a}\pm1.43$	0.026
SV %	$60.43^{c}\pm0.54$	$61.46^{ab}\pm1.21$	$62.48^{b}\pm0.92$	$63.07^{a}\pm1.53$	0.037
DCP g	10.35 ± 0.90	10.75 ± 0.37	10.63 ± 0.51	10.87 ± 0.45	0.658

a, b…. *means on the same raw with different super script are significantly ($p<0.05$) different.*

Rumen Activity in growing saidi lambs fed CaO-treated groundnut vines pelleted diets:

Data in Table 3. shows the rumen activity of growing Saidi lambs fed calcium oxide treated groundnut vines-pelleted diets. Calcium oxide treatments had significant ($P < 0.05$) effects on all the parameters considered except the pH. The values for total volatile fatty acids ranged between 6.33 meq/dL and 8.33 meq/dL for T0 and T4.5, respectively. Ammonia nitrogen was ranged between 26.13 and 32.69 mg/dL for T0 and T4.5, respectively. The use of calcium oxide may stabilize rumen pH values, which is important for optimal fermentation processes. A balanced pH can improve microbial activity and digestion. The ruminal N-NH_3 and VFAs values were linearly increased ($p<0.05$) as the level of calcium oxide increased.

Table (3): Effects of different levels of calcium oxide treatment on rumen fermentation characteristics in growing Saidi Lambs

Item	Time (hrs.)	Levels of CaO%				p value
		T0	T1.5	T3	T4.5	
Ruminal pH	0	6.20 ±0.17	6.55 ±0.30	6.74 ±0.09	6.87 ±0.07	0.13
Ammonia-N (mg/dL)	0	26.13^{ab} ±0.93	26.13^{ab} ±2.47	28.68^{b} ±1.62	32.69^{a} ±2.8	0.05
TVFA (meq/dL)	0	6.33^{b} ±0.33	7.00^{ab} ±0.58	7.67^{ab} ±0.33	8.33^{a} ±0.33	0.04

a, b…. means on the same raw with different superscripts are significantly ($p<0.05$) different.

According to Nuñez *et al.* (2014), steers fed 0% CaO had the highest ruminal pH prior to feeding, while those fed 0 and 0.8% CaO showed the fastest post-feeding pH decline, and steers fed 2.4% CaO showed a comparatively stable ruminal pH throughout the 24 hours (treatment × time; $P \leq 0.01$). At 0, 3, 6, and 12 hours after feeding. The current results (Table 3) showed also that total VFA concentrations was increased linearly ($P \leq 0.05$) in tandem with increasing CaO levels.

Feeding groundnut vines treated with 4.5% CaO gave improvements of 31.59 and 25.10% in the production of TVFA's and rumen NH_3-N. The levels of ammonia nitrogen in the rumen can be affected by protein degradation. Proper levels of CaO treatment may improve nitrogen utilization and reduce excess ammonia, promoting a higher rumen environment.

Impact of different calcium oxide levels on serum blood parameters:

Data presented in Table 4 showed that the serum glucose was mostly increased (P<0.05) for lambs fed different levels of CaO supplementation compared with the control. The same trend occurred when the level CaO increased. The highest values of cholesterol, glucose, AST, and ALT were observed when lambs fed groundnut treated with 4.5% CaO. All blood parameters were in the normal range. Significantly (P<0.05) increased in treated groups compared to the control group. Moreover, no significant differences were observed in serum albumin, globulin and uric acid concentrations among all groups fed different levels of CaO. The highest (P<0.05) values of triglyceride, cholesterol, and glucose were in the level 4.5%CaO group while the lowest (P<0.05) was 0%CaO group. The highest (P<0.05) value of serum glucose was recorded with lambs received level 4.5% CaO% While, the lowest (P<0.05) value was recorded with lambs fed untreated groundnut vines. In addition, data presented in Table 4 showed that the highest of AST and ALT were observed in 4.5% CaO group**.**

Table (4): Effect of different levels of CaO on serum blood parameters.

Blood parameters	Levels CaO				p value
	T0	T1.5	T3	T4.5	
Total Protein g/dl	7.35b±0.15	7.40b±0.18	7.59a±0.19	7.69a± 0.21	0.052
Albumin g/dl	3.26±0.14	3.34±012	3.41±0.13	3.42±0.16	0.850
Globulin g/dl	3.98±0.19	4.01±0.21	4.28±0.17	4.33±0.24	0.517
Triglycerides mg/dl	146.06±4.90	146.68±3.75	149.09 ±5.53	149.45±5.09	0.044
Cholesterol mg/dl	59.78 ±2.02	60.89 ±3.11	66.67 ±2.32	67.11±3.01	0. 011
Glucose mg/dl	103.70b±4.71	110.87ab±4.08	112.84ab±4.82	116.30a±5.80	0. 032
Urea mg/dl	45.69b±0.29	46.20ab±0.49	46.24ab±0.53	47.01a±0.73	0. 038
uric acid mg/dl	1.44±0.06	1.48±0.07	1.50±0.07	1.52±0.07	0.867
Creatinine g/dl	0.95b±0.06	1.07b±0.08	1.12a±0.08	1.14a±0.08	0. 027
AST U/l	83.35b±4.16	83.87b±4.64	91.11ab±4.73	96.95a±8.37	0. 029
ALT U/l	24.79b±2.72	25.75ab±6.20	25.97ab±3.21	27.79a±2.61	0. 045

[a, b]…. Means on the same raw with different super script are significantly (p<0.05) different.

Effect of different levels of CaO supplementation on growth performance:

Data in Table 5. showed a higher significant (P < 0.05) effect on the final body weight value of 53.4 kg at level 4.5% CaO compared to 46.50 kg for growing Saidi lams fed control ration. Average daily gain (g/d) ranged between (147.11g/d and 174.33g/d) for lambs on 0% CaO treated groundnut vines and 4,5% CaO treated groundnut vines diets, respectively. Treating groundnut vines with calcium oxide improved digestibility and nutrient availability, potentially leading to better average daily weight gain in saidi lambs.

Table (5): Effect of different levels of calcium oxide supplementation on growth performance.

Item	Levels of CaO				P Value
	T0	T1.5	T3	T4.5	
Initial wt. (kg)	20.02 ±1.93	23.79 ±0.60	22.17 ±1.88	21.03 ±1.25	0.378
Final wt. (kg)	46.50^{b} ±3.67	52.41^{ab}±1.54	52.87^{a} ±0.94	53.4^{a} ±2.24	0.018
Total gain (kg)	26.48^{b} ±1.77	29.08^{ab} ±0.90	31.23^{a} ±0.90	31.38^{a} ±0.65	0.033
Daily gain (g)	147.11^{b} ±10.38	161.56^{ab} ±5.25	173.50^{a} ±5.28	174.33^{a} ±3.78	0.039

[a, b]…. Means on the same raw with different super script are significantly (p<0.05) different.

In addition, Nuñez *et al.* (2014) found that the inclusion of CaO up to 1.6% was effective in improving performance of feedlot cattle. Many researchers have found that the average daily gain was increased by increasing the levels of groundnut haulms in the diet Prasad (2000); Abubakar *et al.* (2005); Ayantunde *et al.* (2007); Abdou *et al.* (2011); Ososanya (2012) and Viramgama *et al.* (2013).

Data in Table 5. showed significant (P < 0.05) effect on the total gain value of 26.48, 29.08, 31.33 and 31.38 kg/d for T0, T1.5, T3 and T4.5, respectively. These results agree with the findings of Awadalla *et al.* (1997), who reported that feeding groundnut hay and Egyptian clover hay (G2) led to a significant increase in total weight growth (21.4 kg) (P<0.05).

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تأثير استخدام عرش الفول السوداني المعامل بمستويات مختلفة من أكسيد الكالسيوم على قياسات سائل الكرش والدم ومعاملات الهضم في الأغنام الصعيدي.

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تهدف هذه الدراسة إلى تقييم تأثير معاملة عرش الفول السوداني بمستويات مختلفة من اكسيد الكالسيوم على قياسات الكرش وهضم العناصر الغذائية ومؤشرات الدم والأداء الانتاجي للحملان الصعيدي النامية. قسمت المعاملات الغذائية الي اربعة معاملات: العليقة الاولي: عليقة المقارنة :عليقة أساسية من الفول السوداني بدون(CaO)؛ العليقة الثانية تتكون من عليقة المقارنة +CaO % 1.5؛ العليقة الثالثة تتكون من عليقة المقارنة + CaO %3والعليقة الرابعة تتكون من عليقة المقارنة + 4.5%CaO؛ استخدم ثمانية وعشرون حمل صعيديً للمجوعات التجريبية الاربعة (كل مجموعة من7 حملان) في تصميم عشوائي كامل لمدة 180 يوماً، كان متوسط وزن الجسم الابتدائي 21.75 كجم، ±0.7%. ونسبة البروتين في كل المجموعات التجريبية 21, 13 %. أظهرت النتائج ان المادة الجافة المأكولة زادت زيادة رقمية بزيادة نسبة أكسيد الكالسيوم حيث سجلت المجموعة الرابعة :(4.5% CaO) أعلي قيمة للمادة الجافة المأكولة (1224 جرام / يوم وأقل قيمة في مجموعة المقارنة (1208 جرام / يوم) كانت أفضل معاملات الهضم للمجموعة الرابعة التي تم معاملتها ب4.5%CaO في المادة الجافة المهضومة والمادة العضوية المهضومة والبروتين المهضوم والالياف المهضومة والدهن الخام المهضوم وأقل في القيم الهضمية لكل العناصر الغذائية هي مجموعة المقارنة 0%CaO حققت المجموعة الرابعة (4.5%CaO) أعلي قيم معنوية لكلا من أمونيا الكرش والاحماض الدهنية الطيارة (32,69 ملي /أجم و8,33 meq/dlعلي التوالي . وأقل قيم كانت للمجموعة المقارنة في قياسات الكرش (26,13 ملي/جم و6,33 meq/dl علي التوالي) أما بالنسبة لقياسات الدم فكانت كل القياسات للمجموعة 4.5%CaOمتفوقة معنويا علي المجموعة المقارنة ($p<0.05$) أما الالبيومين والجلوبيولين فلم تظهر أي إختلافات معنوية بين المجموعات التجريبية. أما بالنسبة للوزن الكلي فسجلت المجموعة الرابعة أعلي وزن كلي (31,38 كجم) وأقل وزن كلي للمجموعة المقارنة (26,48 كجم) وكانت الزيادة معنوية ($p<0.05$) وكان أعلي معدل نمو يومي للمجموعة 4.5%CaO حيث حققت 174,33 جرام /اليوم أما مجموعة المقارنة 0%CaO فكانت أقل معدل نمو يومي (147,11جرام /اليوم) وكانت الزيادة معنوية ($p<0.05$) .

***الكلمات المفتاحية**: عرش الفول السوداني – أكسيد الكالسيوم – معامل الهضم – قياسات الكرش – معدل الزيادة اليومية*