J.Animal and Poultry Prod., Mansoura Univ., Vol. 5 (12): 737- 757, 2014

EFFECT OF NATURAL TOTAL GLYCOALKALOIDS IN DISCARDED POTATO TUBERS AND VINES ON MILK YIELD AND RUMEN ENVERONMENTAL IN DAIRY ZARIBI GOATS .

Saleh, M.R.M.
Animal Production Research Institute, Agricultural ResearchCenter, Dokki, Egypt .

ABSTRACT

This work aimed to study the residual of total glycolalkaloids (TGA) in discarded, trophy and greenish spots of tubers and vines as a natural toxic components and their effects on milk yield, milk composition and rumen activities of lactating Zaribi goats fed potato tuber and vine on the form of silage or hay. Twenty four lactating Zaribi goats with an average body weight of 41.76 kg and aged 30-36 months. Animals were divided into three similar groups (8 animals in each) were assigned randomly to receive one of 3 experimental rations. Animals were fed concentrate feed mixture(CFM)to cover 50% of requirements according to NRC(1990).The experimental diets were 50%concentrate feed mixture(CFM)+50% experimental materials as well as berseem hay as control (G_1),potato tuber and vine silage(PTVS)or potato vine hay(PVH)in second and third rations(G_2 & G_3),respectively.The experiment lasted for 120 days. Nutrient digestibility's and nutritive value were determined. Data obtained for TGA values were significantly($p<0.05$) higher for potato vines hay(PVH) in (diets, milk, feces and urines) than potato tubers and vines silage (PTVS).Moreover minerals in experimental rations as well as macro-elements(Calcium, Phosphor ,Magnesium, Sodium, Potassium) and micro-elements(Copper, Zinc, Manganese and Iron) of G_3 was significantly($p<0.05$) lower among all tested treatments, whereas the excretion of same elements in feces and urine of G_3 ration were significantly($p<0.05$)higher than the G_2 values. On the other hand PTVS (G_2) had higher quality of all tested parameters as well as pH, ammonia, lactic acid and total volatile fatty acid (TVFA's).Subsequent daily DM intake of dairy goats as % BW or g/kg $w^{0.75}$ decreased with G_1 (3.58 and 90.99) and G_2 (3.62 and 91.91)respectively, compared with G_3 (3.69 and 93.73). At same time,the feed intake tended to increase with G_1 and G_3 groups and the values were(61.3:38.7&61.7:38.3)respectively compared with G_2 ration(60.9 :38.1).Data of hematology clearly that values of white blood cells count (haematocrit, AST, ALT, urea, creatinine and bilirubin)were significantly($P<0.05$)higher of G_3 group compared to G_1 and G_2 groups. Moreover, Milk yield of dairy goats was significantly($P<0.05$)lower with G_3 (1.376 kg/h/d) than G_1 (1.451kg/h/d)and G_2 (1.417 kg / h / d) respectively.The CP of digestibility was significantly increased with ration containing PTVS and control.While the difference of CP digestibility between G_1 and G_3 rations were about 10% . Addition to NDF, ADF, Hemicellulose ,cellulose and ADL digestibility coefficients of G_3 ration were significantly($p<0.05$)lower compared to the other tested rations. This may be due to the high concentration of ADL in G_3 and G_1 rations .Cell wall constituent(CWC)as NDF, ADF, ADL, celluloses and hemicelluloses recorded higher significant ($p<0.05$) for G_1 and G_2 rations than G_3.The higher values of acetate, Butrate ,Iso-Butyrate were recorded with G_3. Ammonia-N and TVFA's in rumen liquor were higher with G_2 followed by G_3 and G_1 through different sampling times.The total bacterial count, cellulytic bacteria and protozoa were recorded significantly higher($p<0.05$)with G_2 at 0,3 and 6 hrs post-feeding.

Keywords: Total glycoalkaloids (TGA)residue, Milk yield and constituents, mineral, goats rumen,

INTRODUTION

The population of ruminant animals in Egypt was predicated to be as 9.3 million animal units in year 2008.This animals required about 15.6 million tons of TDN and 2.345 million tons of DCP (Abdelhamid *et al*.,2001).The available conventional feed resources could cover only 84% and 89%of the required TDN and DCP, respectively(Abou Akkada,1984).This shortage of the concentrate feed in Egypt is a well-known problem. Therefore, several studies were carried out to improve the nutritive values of the poor quality roughages to overcome the feed shortage problem and the dramatic increase in prices of animal feed ingredients. Low fecal excretions of minerals as calcium, magnesium, phosphorus, and sulfur resulted in positive balances for these minerals. Abdelhamid *et al*.,(1999 a& b)reported that blood minerals of dairy Zariby goats contained 8.13-8.29 mg Ca/dl,3.45-4.31 mg P/ dl,2.69 - 3.63 mg/dl and 60.8-96.2µg Fe/dl.On the other side the National Toxicology Program suggests that the average American consumers must be not receive more than12.5 mg /person/day of total glycoalkaloids(TGA) of greenish spots and trophy potatoes.So up to date there are a few literature on using discarded and trophy potatoes residues in animal feeding .Therefor, there is a need for more studies on using these fields by-products in animal feeding. However, feeding common greenish potato led to TGA toxicity and affected performance of starter, growing and finishing ruminants (Patil *et al*.,1972) and (Jadhav *et al*.,1981)found natural occurring toxic alkaloids in potatoes by-products.(Morris and Lee,1984)and(Renwick *et al*.1984)reported TGA causing emberyotoxicity and teratogenicity, also it was inhibition of rat cholinesterase isoenzymes *in vitro* and *in vivo* by the potato alkaloid.(Alozie *et a*l.,1978) found that toxic dose of TGA from 0.01-0.1% of potato on DM bases.

MATERIALS AND METHODS

The present study was carried out at El-Serw Animal Production Research Station, Animal Production Research Institute, Agricultural Resech Research Center, Cairo, Egypt .

Experimental animals

Twenty four dairy Zaribi goats were used in this study having average live body weight of 41.76 kg and about 30 moths of age. All goats were healthy.The goats were divided randomly into three similar groups(eight animals each) according to body weight. Each group was housed in separate closed pen and kept under shade and all groups received the same management under the same conditions.Animals were weighed at the begining and at biweekly intervals thereafter .The experimental lasted for120 days.

Feeding and management

All animals were fed concentrate feed mixture(CFM)to cover 50%of requirements recommended by NRC(1990).In addition to 50% of one as following berseem hay as control (G_1), potato tuber and vine silage(PTVS) or potato vine hay(PVH) in second (G_2 & $G_{3)}$ and third rations

respectively.Raton's were offered twice daily at 8 am and 4 pm, water was available all times and measured daily as average for each group. Sample of feeds were analyzed according to the procedures of A.O.A.C.(2000).Nutrient digestibility.

Silage preparation

Greenish spots, discarded, trophy and greenish spots tubers in addition to some smaller infirmity and fresh aerial parts were chopped manually using knives, then wilted by spreading under direct sun for a day then mixed with wheat straw : fresh potato tubers and vine at ratio of(4:1 ratio on DM bases)then supplemented with 5% molasses and 3% urea and ensiled in white plastic bags for 2 months before feeding. After ensilage , the color and odor of the silage were examined and samples were taken for chemical analysis , total glycoalkaloids (TGA) was determined and silage quality test was performed then the silage was stored in closed room .

Milk yield and milk samples

Individual morning and evening milk yield of lactating dairy Zaribi goats were recorded daily. Milk samples (about 0.5% of total milk produced) were taken once biweekly from each goat .Then the samples were mixed and analyzed for total solid(T.S),fat, solid nonfat (SNF)and ash. Milk fat, lactose and protein, while milk was calculated by difference. And TGA was qualitative determination.

Blood samples

Blood samples were collected from the jugular vein once before feeding (3 animals from each group).It collected into tubes with anticoagulant for determination of the total Neutrophil, Lymphocyte, Monocyte and Eosinophil on blood film stained with wrights stain(Coles,1986).The red and white blood cells were determined(Miller and Weller1971)in whole blood. Blood samples were centrifuged at 4000 rpm for 20 minutes. Part of the separated serum was used to enzymes activity determination, while the other part was stored frozen at-20c^{0}till the biochemical analysis.Commercial kits were used for colorimetric biochemical determinations.

Rumen liquor and microorganisms

Rumen fluid samples were taken from 3 animals of each experim-ental group using stomach tube before feeding (0 time)and 3 and 6 hrs post-feed-ing.The samples were filtered through3 layers of gauze and immediately subjected to the determination of pH value using pH meter. Ammonia nitrogen(NH3-N)concentration was determined according to Conway (1957),total volatile fatty acids(TVFA) was determined according to Warner (1964) and Erwin *et al*.,(1961).Direct microscopic counts of bacteria was determined according to Warner(1964),while microbial protein was determined according to Schultz and Schultz(1970).Enumeration of cellulolytic bacteria was determined according to Mann (1968).Total protozoa count were determined according to Abou-Akkada *et al*.,(1969).

Feces and urine collection

At end of the experiment three animals from each group were chosen and put in metabolic cages for, feces and urine collection daily for seven successive days after two weeks preliminary period. Urine was measured daily and collected after diluted with 20 ml of conc. sulfuric acid to

preserve ammonia until nitrogen determination.Whereas TGA was determination quantitivly in PTVS , PVH, feces and urine. On the other hand feed intake was recorded daily.

Analytical methods

Analysis of feed ingredients and feces were carried out according to A.O.A.C.(2000) for DM, OM ,CP and EE. Plasma biochemical analysis was done using reagent kits.TGA was determined according to Carman *et al.* (1984) and Bushway and Ponnampalam (1985). Milk fat (MF) , total protein (TP) , total solid(TS),solid nonfat(SNF)and ash according to Ling(1963). Total protein was determined according to Weichselbaum (1989) , albumin was determined according to Doumas *et al*., (1971),urea according to Patton and Crouch(1977),liver enzymes was determined according to Reitman and Frankle(1957),total cholesterol was determined according to Monnet(1963),creatinine according to Bartiles(1971),bilirubin was determined according to Elveback (1970).Whereas hemoglobin and haematocrit was determined according to Linne and Ringsrud (1992), red and white blood cells was determined according to Miller and Weller (1971).

Statistical analysis

Data was statistically analyzed using SAS(2003).When F-test was positive, least significant differences was determined according to Duncan (1955).

RESULTS AND DISCUSSION

Composition of ingredients and experimental rations

Data in Table(1)showed the analysis of feed ingredients and experimental diets. CP was significantly higher($p>0.05$)with G_1 and G_2 rations. These results are consistent with those obtained by Abdelhamid *et al*.,(1992) reported that there were variations in the chemical composition of different agriculture wastes .CF,EE and NFE of G_2 ration was significantly($p<0.05$) higher than the other experimental rations.The increasing of TGA level in PVH is very danger indication because its accumulation in body and act as over load on kidney and liver and finally lead to ecumenical loss or death of animals.These results agreement with (Gull *et al* .1970 and Dalvi and Bowie 1983), reported that TGA is a toxic in greenish spots of *Solanum sp* , it defects the protein digestibility and growth performance .

Total glycoalkaloids (TGA)

TGA residues was determined for G_1 , G_2 and G_3 rations as well as feces, urine and milk Table(2), and data obtained showed clearly that G_1 ration free of TGA, whereas G_3 was significantly($P<0.05$) higher for both ration, milk ,urine and feces than those of G_2 .These data are in agreement with those of Alozie *et al*.,(1978)who reported that there inhibition of cholinesterase isoenzymes *in vitro* and *in vivo* of TGA , whereas Anon(1988) reported that TGA is a poison associated with a school lunch program while Dalvi and Bowie(1983) reported that TGA is toxic and it inhibit protein digestibility and growth performance. Additional Hansen(1985) found two fatal cases of greenish spots potato are poisoning. On the other hand Chabue and

Swinyard(1976) found that TGA is teratogenicity and toxicological phenolic compound with *solunum tuber0sum (ST)*.

Table (1) : Chemical composition of ingredients and experimental rations fed by dairy Zaribi goats (% on dry matter basis).

Items	OM	CP	CF	EE	ASH	NFE
Ingredients						
CFM*	89.70	14.88	13.40	3.10	10.30	58.92
B H**	88.58	14.16	25.14	2.59	11.42	46.69
PTVS***	86.23	13.08	14.20	3.48	13.77	56.47
PVH****	88.49	11.89	17.55	2.86	11.51	56.19
Experimental rations						
G_1	89.22	13.94^{A}	14.09^{B}	2.85^{B}	10.78^{A}	58.34^{B}
G_2	90.24	13.30^{A}	11.48^{C}	3.96^{A}	9.76^{B}	61.50^{A}
G_3	89.57	11.59^{A}	17.55^{A}	2.76^{B}	10.43^{A}	57.67^{B}

Means with different superscripts within the same column are significantly different at (P<0.05) .

***Concentrate feed mixture (CFM) is consists of cotton seed 16.5.%, yellow corn 41.50%wheat bran 25%, soy been meal (44% CP)7.0%,molasses 5.00%,3% Urea, common salt 0.5% % and limestone 1.50%.**

**** (BH) =Berseem hay ***(PTVS) = Potato tubers and vines silage **** (PVH)=Potato vines hay**

Table (2): TGA contents of diets, feces , urine and milk of dairy Zaribi goats fed experimental rations .

Items	TGA consumed , mg / h / d		
	G_1	G_2	G_3
rations	-	133.88^B	382.51^A
Feces	-	39.80^B	71.93^A
Urine	-	28.47^B	58.21^A
Milk	-	29.37^B	72.63^A

Means with different superscripts within the same row are significantly different at (P<0.05) .

Silage quality

Data in Table(3) indicated that G_2 silage had higher quality of all tested parameters including pH, ammonia ,lactic acid and TVFA's.These results were inagreement with those reported by Abou-Akkada and Nour (1986),since ensilage can preserve feed and improve its feeding value.

Table (3): Mean values of different quality parameters of potato silage.

Items	G_2
PH value	4.69
Ammonia- N (mg/100g)	24.75
Lactic acid(mg/100g)	2.31
TVFA's (ME q/100g)	22.10
Ammonia % of DM	7.12
Lactic acid % of DM	0.76

Feed and water consumption

Daily DM intake of dairy goats are presented in Table (4).The total

Table(4) : Body weight gain, DM Intake and Daily Feed intake of Zaribi goats Fed on tested Experimental Rations.

Items	G_1	G_1	G_1
Average BWG (KG)		41.76	
DM intake (gm/d/h)			
CFM	585	585	590
BH	925	-	-
PTVS	-	910	-
PVH	-	-	950
Total DM intake (gm/d/h)	1510^A	1495^B	1540^A
DM intake, % BW	3.62	3.58	3.69
DM intake, g/kg$w^{0.75}$	91.91^A	90.99^B	93.73^A
Roughage:concentrate(R/C) ratio	61.3:38.7	60.9:38.1	61.7:38.3
Daily water consumption			
L/h/d	3.67	3.32	3.96
Ml/kg BW	88^A	80^B	95^A
Ml/ kg $W^{0.82}$	234^A	202^B	241^A
Ml/g DM intake	2.43^A	2.23^B	2.57^A

Means with different superscripts within the same row are significantly different at (P<0.05) .

DM intake as % BW or g/kg $w^{0.75}$ was decreased with G_2 (3,62 and 91.91) and G_1 (3.62 and 90.99),compared with G_3 (3.69 and 93.73) respectively. In the same time,the ratio of roughage to concentrate tended to increase with both G1 and G_3 (61.3 : 38.7 and 61.7:38.3)respectively, than G_2 ration(60.9: 38.1).Generally, the increased roughages intake as well as berseem hay(BH),PTVS and PTVH gave positive evidence for silage of good quality and Ensiling improved feeding value with lactating goats,that as reported by Abou Akkada and Nour(1986).Whereas the data of average daily water consumption showed that there higher significantly differences($p<0.05$)with G_1 and G_3 than G_2 ,whereas no significant differences were noticed between G_1 and G_3 .

Blood picture

Data in Table (5) indicated that blood of animals fed G_2 ration showed significantly higher($P<0.05$)total protein,albumin and glucose concentrations than does given G_1 and G_3 rations .The high concentration of total blood proteins in group 2 (G_2) may be due to increase synthesis of protein from urea supplement during silage making , Harinder *et al.,* (2008). Also they recorded that chemical composition proved that tubers and vines silage are good source of protein(13.8%) and carbohydrates (60.0%)when supplemented to ration instead of berseem hay.On the other side data obtained showed that there higher significant differences($p>0.05$)of blood ketones, APT,AST,GGT,LDH,WBC,RBC,Hb,hematocrite and percentage of PCV between all tested treatments. Blood biochemical determination revealed that reductions of G_1 and G_2 in total protein, albumin and glucose concentrations Compared to G_3 ration. Rich blood biochemical may be due to the utilization proteins as a result of urea supplement . Also, great level of glucose in blood was related to altitude carbohydrates.TGA have an enhancement effect on red and white blood cells Azim *et al*.,(1984).they reported that high glycoalkaloid feeding caused negative effects on red blood cell counts and hemoglobin concentr-ation . Pollman and Danielson(1980) reported that PVH was high of TGA and it caused increased in haematocrite, AST,ALT,urea,creatinine and bilirubin . Moreover the other blood constitutes (RBC,Hemoglobin,Total protein and Total cholesterol)significantly($p<0.05$) higher for both G_1 and G_2 than G_3. In addition to data of white blood fractions showed significant ($p<0.05$) decrease in erythrocyte and leucocytes for G_3 compared with G_2 and G_1 .On the other side the fractions of white blood cells(neutrophile and lymphocyte%)and eiosinophile were significantly higher ($p<0.05$)and the monocyte was significantly lower for G_3 .This increases of lymphocyte and neutrophil for G_3 may be due to the increases of TGA level and the decreases the of protein compared to other tested group . beside that the TGA have an enhancement effect to the humeral immune response and increase white blood cells as reported by Saleh et al.,(2009).

Table (5): Blood parameters and hematological picture of lactating Zaribi Goats affected by experimental rations.

Blood parameters	G1	G2	G3
WBC (x103/L)	9.43^{A}	9.26^{B}	10.07^{A}
RBC (x106/L)	11.29 ^{A}	10.98^{A}	9.57^{B}
PCV (%)	31.37^{B}	30.61^{B}	34.26^{A}
Hb (g/dl)	10.30	10.70	9.83
Hematocrit (%)	21.50 ^{B}	25.50^{B}	33.20^{A}
Total protein (g/100g)	8.60 ^{A}	8.30 ^{A}	6.77^{B}
Albumen (g/100 g)	3.86 ^{A}	3.92 ^{A}	3.03^{B}
Globulin (g/100 g)	4.74 ^{A}	4.38 ^{A}	3.74 ^{B}
BTKB / mmol/l	9.63	9.88	9.46
Creatinine mmol/l	75.25^{A}	61.39^{B}	88.39^{A}
AP (U/L)	54.81	58.39 B	57.51
AST(µ/ml)	44.0B^{C}	38.00^{C}	76.00^{A}
ALT(µ/ml)	27.0B^{B}	20.00 ^{B}	40.00^{A}
GGT (U/L)	62.48^{A}	54.48^{A}	48.83^{A}
LDH (U/L)	248.22^{A}	218.96^{B}	202.37^{B}
Glucose(mg/dl)	47.73^{A}	55.82^{A}	48.62^{B}
Totalcholesterol (mg/100ml)	144.4 ^{A}	128.0^{A}	109.0^{B}
Urea (mg/100ml)	18.30^{B}	21.90^{B}	33.60^{A}
Creatinine (mg/100ml)	0.80^{B}	0.74^{B}	1.30^{A}
Bilirubin (mg /100ml)	0.40^{B}	0.39^{B}	0.60^{A}
Lymphocyte (%)	55.8^{B}	57.3^{B}	63.7^{A}
Neutrophile (%)	42.5^{B}	41.8^{B}	57.9^{A}
RBCs (10^{6} ul)	10.04^{A}	10.77^{A}	8.58^{B}
Eiosinophile (%)	5.20^{A}	4.70^{B}	6.90^{A}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Milk production and composition

Table(6) : Showed average milk yield and its constituents of Zaribi goats given the different experimental diets.The differences in milk yield were significant (P<0.05)among the tested the experimental rations.The daily milk yield had the highest values with G_2 (174 kg over the experimental period followed by G_1 (170 kg /over the experimental period) and the lowest value was recorded with G_3 ration (164 kg over the experimental period).This results in agreement with those obtained by (Polman and Danielson, 1980 , Saleh et al ., 2007& 2008)reported that TGA have an enhancement effect on the humoralimmune response.Milk yield,fat,total protein(TP),total solid(TS),and solid not fat (SNF)of G_1 and G_2 were significantly (P<0.05)higher than G_3 group.These improvements of milk yield and composition in G_2 was correlated with the high OM,CP and NFE and lower CF and ash than G_1 and G_3 .(Table1).These improvements were correlated with low level of TGA in G_2 (Table 2).

Table (6) : Effect of tested rations on milk yield and its constituents of Zaribi goats.

Item	**G1**	**G2**	**G3**
Total milk yield , kg/h	170^{A}	174^{A}	164^{B}
Average milk yield ,kg/h/d	1.417^{A}	1.451^{A}	1.367^{B}
Milk composition:			
Fat,%	3.71	3.89	3.37
Protein,%	3.06	3.24	2.87
Lactose,%	4.73	4.96	4.47
Total solids,%	12.18	12.53	11.82
Solids non fat (SNF),%	8.47^{A}	8.64^{A}	7.95^{B}
Ash,%	0.84^{A}	0.89^{A}	0.77^{B}
Average fat yield, g/h/d	526^{A}	564^{A}	461^{B}
Average protein yield, g/h/d	434^{A}	470^{A}	392^{B}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Minerals utilization

Data of minerals obtained are presented in Table(7).Minerals intake of G3 had recorded higher differences among treatments, than those in G_1 and G_3. These results back to decrease of TGA level in G_2 ration. While minerals excretion of G_3 (feces and urine) were recorded higher variation differences for calcium and phosphorus excretion than those obtained from G_2 and G_1.These results agreed with(Hoek *et al*.,1988) they reported that TGA affecting on magnesium , calcium and phosphorus excretion and relationship between Calcium: phosphorus ratio.

Table(7): Minerals metabolism by dairy Zaribi goats fed experimental rations.

Element	Rations	Intake	Feces	Urine	Retention
Macro – minerals (mg / h / d)					
Calcium	G_1	4833^{B}	978^{B}	228^{B}	3627^{B}
	G_2	5672^{A}	1173^{A}	295^{A}	4204^{A}
	G_3	4511^{B}	953^{B}	247^{B}	3311^{C}
Phosphorus	G_1	3158^{B}	896^{A}	215^{B}	2047^{B}
	G_2	3814^{A}	763^{B}	198	2853^{A}
	G_3	2958^{B}	714^{B}	194	2050^{B}
Magnesium	G_1	3412^{B}	717^{B}	197	2498^{B}
	G_2	4026^{A}	845^{A}	206	2975^{B}
	G_3	3659^{C}	826^{A}	235	2579^{B}
Sodium	G_1	5487^{B}	1183^{B}	308^{A}	3996^{B}
	G_2	6618^{A}	1341^{A}	347^{A}	4930^{A}
	G_3	4394^{C}	922^{C}	233^{B}	3239^{C}
Potassium	G_1	328^{C}	68^{B}	22	238^{C}
	G_2	498^{B}	105^{A}	29	364^{B}
	G_3	548^{A}	112^{A}	33	403^{A}
	Micro - minerals(mg / h / d)				
Copper	G_1	23.76^{C}	4.98	1.75	17.03
	G_2	58.32^{A}	11.75	3.92	42.65
	G_3	46.93^{B}	9.64	2.46	34.83
Zinc	G_1	158.44^{B}	37.13	12.75	108.56
	G_2	242.67^{A}	49.31	17.70	175.66
	G_3	184.26^{C}	37.20	21.60	125.46
Manganese	G_1	640.32	132.15	34.47	473.70
	G_2	911.20^{A}	316.80	38.40	556.00
	G_3	531.60^{C}	134.10	19.30	378.20
Iron	G_1	238.40^{C}	604.20	150.00	1626.4
	G_2	3015.2^{A}	605.40	150.80	2259.00
	G_3	2869.7^{B}	562.80	141.30	2306.90

Means with different superscripts within the same column are significantly different at (P<0.05) .

Digestion coefficients and nutritive values

Nutrient digestibility coefficients and nutritive values of the experimental rations are presented in Table (8).Dry matter (DM) and organic matter(OM) digestibility of G_1 and G_3 rations were significantly ($p<0.05$)lowerer than those of G_2 ration. On the other side G_2 ration data showed the highest

digestibility coefficient of DM ,OM ,CF and EE and significantly($p<0.05$)lower of EE and NFE than those of G_1 and G_3 .The apparent digestibility of CP significantly increased with ration containing PVS and control groups.The different between the control group(G_1)and PVH(G_3)in CP digestibility was about 10%.Subsequen EE digestibility was similar for G_1 and G_2 rations being significantly ($p<0.05$) lower with G_3 ration.The present results are in agreement with those reported by Robb *et al.*,(1994) they found almost similar results to that obtained here . NDF, ADF, hemicellulose ,cellulose and ADL digestibility coefficients significantly decreased with ration containing high level of TGA (G_3) compared to the other tested rations.This depression in digestibility coefficient could be due to the decrease in ruminal fiber digestion that may occur with increasing level of ADF contents in G_3 and G_1 compared to the G_2 ration which resulted in an increase in rate of passage of digest from the rumen Bull *et al*.,(1979).Also TDN and DCP of G_3 was significantly($p<0.05$)lower is affected by the high level of total glycoalkaloids compared with G_1 and G_2 groups. No differences were notice of TDN and DCP between G_1 and G_2 groups,the values of TDN were(67.3 and 10.3),(69.4 and 10.8)and (61.2 and 9.49)for G_1, G_2 and G_3,respectively.These results are in agreement with Schmeider and Flatt (1975);Abd El–Baki *et al*.,(1997).Metabolizable energy values was higher in PTVS compared with G_1 and PVH, and the values were 3179, 3044 and 2985 kcal/kg for, G_2, G_1 and G_3, respectively.This agree with Fekete,(1987).Who reported that potato silage was high in metabolisable energy.

Table (8) : Nutrient digestibility coefficients and feeding values of Experimental rations fed by dairy Zaribi goats fed.

Items	G1	G2	G3
DM	72.3^{A}	73.4^{A}	70.6^{B}
OM	70.5^{B}	74.2^{A}	68.7^{B}
CP	67.2^{B}	71.6^{A}	64.6^{C}
CF	69.3^{A}	70.6^{B}	65.1^{C}
EE	66.4^{B}	63.2^{C}	69.5^{A}
NFE	70.2^{A}	68.5^{A}	62.8^{B}
Fiber fraction digestability , %			
NDF	62.18^{A}	57.55^{B}	65.92^{A}
ADF	59.53^{A}	53.55^{B}	61.88^{A}
Hemcellulose	69.18^{A}	60.75^{B}	67.73^{A}
cellulose	70.59^{A}	62.18^{B}	67.18^{A}
ADL	^{A}	28.14^{B}	32.90^{A}
Nutritive value , %			
TDN	67.3^{A}	69.4^{A}	61.2^{B}
DCP	9.37^{A}	9.52^{A}	7.49^{B}
ME kcal / kg diet*	3081^{A}	3242^{A}	2986^{B}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Cell wall constituents (CWC) of the experimental diets

The means of cell wall constituents of experimental diets are presented in Table (9). G_2 had the lowest contents of neutral detergent fiber (NDF),acid detergent fiber (ADF),acid detergent lignin (ADL),hemicelluloses and cellulose than other experimental rations.These results agree with those of Azim *et al*.,(1983)who found that greenish spots of potato contained 60.6%cell wall constituents(CWC),ADF 54.9 %,hemicelluloses 5.7% , ADL 37.7 % and cellulose 10.6 %.These results are more than those obtained here .

Rumen liquor parameters

Data of liquor as well as pH values, ammonia-N levels ,and total volatile fatty acids(TVFA´s)concentration of rumen liquor of the experimental animals are presented in Table(10)there were significant differences among sampling time($p<0.05$)among dietary treatments for all tested parameters. Although NH3-N concentration gradually decreased by sampling time till the 6 hrs, the pH values decreased only till the 3 hrs, but on the opposite,TVFA´s level gradually increased till 3 hrs post-feeding.The normal relation of rumen parameters were realized, since there were positive relation between pH value and NH3-N concentration and negative relations with TVFA´s levels.Since consuming NH3-N by ruminal micro-flora producing TVFA´s leading to lowering pH values. G_2 group produced the lowest pH in compared to others.These results of overall pH were in harmony with those obtained by Khalifa (1972) who noticed that pH of rumen liquor with sheep was high(7.1) before feeding then declined to (6.8) at 3 hrs .

Table (9) : Cell wall constituents (CWC) of the experimental diets(on DM basis).

Items	G_1	G_2	G_3
NDF	44.77^{A}	31.21^{C}	38.07^{B}
ADF	32.94^{A}	24.94^{C}	29.21^{B}
ADL	10.26^{A}	7.10^{B}	9.34^{B}
Hemicellulose	11.83^{A}	6.27^{B}	8.86^{C}
cellulose	22.68^{A}	17.84^{B}	19.87^{A}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Table(10): Rumen liquor parameters of lactating Zaribi goats fed on experimental rations.

Item	Time	G_1	G_2	G_3
pH	0	6.87	6.15^{B}	6.92^{A}
	3	6.64^{A}	6.02^{B}	6.51^{A}
	6	6.56^{A}	6.07^{B}	6.43^{A}
Ammonia –N mg / 100 ml	0	14.58^{B}	22.21^{A}	16.46^{B}
	3	16.94^{B}	25.04^{A}	19.33^{B}
	6	13.67^{B}	21.18^{A}	14.85^{A}
TVFA´s meq / 100 ml	0	8.24^{B}	12.56^{A}	7.85^{B}
	3	13.87^{B}	17.67^{A}	13.53^{B}
	6	10.51^{B}	14.24^{A}	9.15^{B}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Molar proportion of ruminal volatile fatty acid (TVFA´s)

Differences between acetic, propionate, butyrate and Iso-butyrate values of rumen liquor of lactating Zaribi goats fed Potato silage or hay shown in Table (11).Data clear that there significant ($p<0.05$) decrease in acetic, butyrate and iso-biotrate and increase of propionate and valerate of G3 , compared to control and G2. Acetic :propionate(A/P) ratio indicated an improvement of propionic production in G2, while it recorded highest value with G3.The results obtained were confirmed those represented by Mohammed *et al* ,(2003).

Table(11). Molar proportion of ruminal volatile fatty acid (TVFA´s) of lactating Zaribi goats fed on experimental rations .

Item	G_1	G_2	G_3
Acetate , %	39.86^{A}	35.55^{C}	37.33^{B}
Propionate , %	27.84^{B}	34.51^{A}	22.85^{C}
Acetate:Propionate %	1.43:1	1.03:1	1.63:1
Butyrate, %	19.57^{B}	17.21^{C}	21.84^{A}
Iso - butyrate %	2.68^{A}	1.67^{B}	2.91^{A}
Valerate, %	1.76^{B}	2.49^{A}	1.37^{B}

Means with different superscripts within the same row are significantly different at (P<0.05) .

Rumen microorgani

Ration containing tuber and vine silage has a great effect in terms of increased the total viable bacterial count in rumen($P<0.05$) compared with G1 and G3(Table12).Bacterial counts were significantly higher($p<0.05$) for G2 group before feeding , 3 and 6 hrs post-feeding and the values being 1860, 2617and $4346x10^{7}$/ml.These values were higher than other tested treatments. The results obtained are in harmony with those of Kurihara *et al*.,(1998) they observed that the peak of bacterial counts was between 3 and 6 hrs after feeding .

Moreover, the results of total cellulolytic bacterial count showed that the highest values of total cellulolytic bacterial obtained at 3 hrs after feeding for G2, but the lowest value was recorded with G3 and G_1 .In this respect, Behraka *et al*.,(1991)reported that rumen have a large and more active bacterial population, it may help to increase the rate of digestion.In the other studies,Nour *et al*.,(1989) found that feeding animals on concentrate with roughages increased the total protozoal count in the rumen .

The results of total protozoal count recorded the highest values at 3 hrspost-feeding with G2 ration compared with other experimental treatments.

While the lowest values were recorded with G_3 ration .This may be back to the high level of TGA in G_3 ration.These results were in Harmony with those obtained by Sony and Sharma(1982)who found an increased in ciliate protozoa count($p<0.05$)with increasing concentrate and silage level in diets. This possibly may be related to its ability to ingest starch,the maximum protozoal counts were observed at 3 hrs post-feeding than immediately before feeding.

Table (12) . Effect of experimental rations fed by lactating Zaribi goats on Rumen microorganisms

Items	Time	G_1	G_2	G_3
	0	1519 ^{B}	1860 ^{A}	1347 ^{C}
Total bacterial count (10^7/ ml)	3	2175 ^{B}	2617 ^{A}	2080 ^{C}
	6	3818 ^{B}	4346 ^{A}	3576 ^{C}
	0	2.91 ^{B}	3.16 ^{A}	2.46 ^{B}
Cellullolytic bacterial(10^4/ ml)	3	4.68 ^{A}	5.57 ^{A}	3.91 ^{B}
	6	3.72 ^{B}	4.65 ^{A}	2.64 ^{C}
	0	3.97 ^{B}	4.61 ^{A}	3.88 ^{B}
Total protozoal count(10^4 / /ml	3	3.41 ^{B}	4.79 ^{A}	3.52 ^{B}
	6	2.97 ^{B}	4.27 ^{A}	3.11 ^{B}

Means with different superscripts within the same row are significantly different at P<0.05).

Feed conversion and economical efficiency

Data of average feed intake and average milk yield during experimental period as well as feed conversion efficiency of the dairy Zaraibi goats are summarized in Table (13).The data indicated that average milk yield recorded the highest value with G_2 (1.451kg/h/d) followed by G_1 (1.417 kg/h/d) and lastly,the lowest value (1.376 kg/h/d) with G_3 .Thus, the feed conversion calculated as DM and CP intake/kg milk yield ,and the data obtained show that silage have a better values(1.03 and 0.324,of DM and CP respectively) and G_1 was (1.07and 0.306 respectively)compared with G_3 (1.13 and 0.317,respectively).Whereas water consumption showed significantly ($P<0.05$)higher values with G_2 than the G1 and G_3 groups the values were (3760, 3320 and 3960 ml/h/d)for G_1, G_2 and G_3,respectively.Water consum-ption positively correlated with DM intake, CF and ash content (Table1) and TGA content (Table 2).These results were in agreement with the results obtained in other study Sultan (1995).Moreover , the study shown that use of 50% tubers and vines in the form of silage or

hay in small ruminant nutrition recorded increase of economic efficiency(E.E) with significant($P<0.05$) higher for control group compared to PTVS and PVH rations, the values were 1.86 ,2.88 and 2.62 LE for control , PTVS and PVH respectively. Subsequent the economic revenue % were 0, 55 and 40 % of total coast .These decreases in feed cost of G_2 and G_3 is related to that tuber and vine as silage or hay are cheaper by products.These data are in agree with Murdoch(1992),who reported that cost of animal feed decreased when potato by-products used in lactating animals rations .

Table (13) : Feed conversion and economical efficiency of lactating Zaribi does fed experimental rations.

Item	G_1	G_2	G_3
Average body weight, kg	42.14	41.48	41.66
Metabolic body size, $w^{0.75}$	16.54	16.34	16.40
CFM, g/h/d	585	585	590
Rpughages, g/h/d	925	910	950
Total DM intake, g/h/d	1510	1495	1540
CP intake, g/h/d	210.5	183.9	178.5
TDN intake, kg/h/d	2.16	2.03	2.34
TDN kg /kg milk	1.52	1.40	1.71
DCP intake, kg/h/d	0. 61	0.60	0.58
DCP/ kg milk	13.49	14.92	12.53
Daily water consumption L/h/d	3.67	3.32	3.96
Average milk yield, g/h/d	1417	1451	1367
Feed conversion			
Kg DM / kg milk	1.07	1.03	1.13
Kg CP / kg milk	0.149	0.127	0.130
Daily feed cost (LE)			
Price of daily MILK (LE)	4.25	4.35	4.10
Feed cost (LE) kg milk	2.39	1. 47 ^{B}	1.48 ^{B}
Economic efficiency (E.E.)	1.86	2.88	2.62
Improved of E.E.%	-	55	41

Means with different superscripts within the same row are significantly different a$P<0.05$)
.CFM = 250 LE l KG BH= 1 LE l KG PTVS =.06 LE l KG PVH = .04 LE l KG

CONCLUSIONS

In conclusion, greenish, discarded and trophy potatoes tubers and vines in the form of silage could be used safety,successfully and economically in ration of lactating Zaribi goats .It is recommended therefor to fed tubers and vines as silage and not in the form of hay, because the feeding tubers and vines on the form of silage(PTVS) could decrease feeding cost and increase feed efficiently.

REFERENCES

Abd El-Baki,S.M; A.A.Zaki ;S.M.Bassuny,and K.M.ElGendy,(1997).Nutritional studies on some green forages in Egypt.J.Nutr.Feeds,1(special Issue): 133-143.

Abdelhamid,A.M.; M.S.Nowar and S.M.Bassuny(2001).Evaluation of uncoventional silage making using plant and animal wastes in feeding ruminants.J.Agric.SCI.MansouraUniv.,26:5349-5360.

Abd El hamid , M. A ; E.I .Shehata and M.E . Ahmed (1999 a) .Physio - nutritional studies on pregnant and lactating goats fed on rations deffering in roughage/ concentrate ratio2 –Effect on blood profile .J.Agric. Sci. Mansoura Univ.,24 : 4587- 4597.

Abd El hamid , M.A;E.I Shehata and M.E.Ahmed(1999 b).Physio - nutritional studies on pregnant and lactating goats fed on rations deffering in roughage / concentrate rati3-Effect on productivity and digestion . J.Agric. Sci.Mansoura Univ.,24 :4598 -4612 .

Abdelhamid,A.M.; S.A.El-youty; T.H.Topps; M.M.El-Shinnawy ;A.A.Gabr,and H.H.El-sadany(1992).Evaluation of some untraditional and conventional and feeds in Dakahlia governorate.Arch.Anim.Nutr.,42:371- 381.

Abou-Akkada, A.R.(1984).Evaluation of present status and potential development of animal feed resources in the Arab countries AC Khartom, p.129

Abou Akkada, A .R. and A. M. Nour (1986) . ensilage and improvement of feeding value . Alexandria , Septamber , p . 40 .

Abou Akkada, A.R. ; E.E. Bartley and L.R. Fina (1969) . Ciliate protozoa in the rumen of the lactating cow . J. Dairy Science , 7 : 1088 – 1091 .

Alozie,S.O.; R.P.Sharma and D.K.Salunkhe (1978).Inhibition of rat cholinesterase isoenzymes *in vitro* and *in vivo* by the potato glycoalkalloid,(alpha-solanine and alpha caconine).J.Food Biochem.,2:259- 276.

Anon B.R.(1988).Solanine food poisoning âssociated with a school lunch.J. Agric . Food Chem., 483 - 490.

A.O.A.C.(2000).Association of Official Analytical Chemists of Official Methods of Analysis17 ed. Washington D.C.

Azim,A.,Shaikh,H.A.and Ahmed,R. (1983).Toxic effects of high glycoalkaloid feeding on the protein digestibility and growth of the rabbits.J.Pharm. Univ.Karachi.,2:15-24.

Azim,A.;H.A.Shaikh and R.M.Ahmed(1984).Toxic effects of high glycoalkaloid feeding on the red blood cell counts and haemoglobin concentration of rabbit blood. J.Pharm. Univ. Karachi, 3: 43 - 49.

Bartiles,H.(1971).Calorimetric determination of creatinine.Clin.Acta.32- 81.

Behraka, A.A.;T.G.Nagaraja and J.L.Morrill(1991).Performance and ruminal function development of young rumenants fed diet with TGA fermentation extract . J. Dairy Scie ., 74 : 432 – 4336.

Bull,L.S.;W.V.Rumpler;T.F.Sweaney and R.A.Zinn(1979).Influnce of rumenal turnover on site and extent of digesion Fed. Proc. 38: 2713-2719.

Bushway,R.J. and R.Ponnampalam(1985).alpha-solanine content of potato products.J.Agric.Food Chem., 34:277-279.

Carman,A.S.; S.S.Kuan and O.J Francis.(1984).Determination of the potato glycoalkaloids J.Agric .Food Chem., 66:582-586.

Chaube,S. and C.A.Swinyard (1976).Teratological and toxicologicalstudies of alkaloidal and phenolic compounds from Solanum tuberosumL .Toxicol . Appl .Pharmacol.,36:227-237.

Coles , E.H.(1986). Vetrinary Clinical Pathology . W.B.Saunders Company , Philadeliphia . USA.

Conway, E.F.(1957). Micro diffusion Analysis and Volumetric Error. Rev. Ed. Lock Wood, London.

Dalvi,R.R.and W.C.Bowie (1983).Toxicology of solanine: an overview.Vet. Hum. Toxicol., 25: 13-15.

Doumas, B.T.; W.Watson and H.G. Biggs (1971). A method determination of plasma albumin. Clin . Chemists Acya, 31:87.

Duncan, D.B.(1955). Maltiple range and multiple F-test . Biometrics,11: 1- 42 Elvebach , I.R. (1970) Method of calcium determination in foods and feed J.Am . MED. Ass., 211- 69

Erwin ,E.S ; G.J. Marcoand and H.Emery (1961).Volatile fatty acids analysis of blood and rumen fluid by gas chromatography.,J.Dairy Sci.,44:1768.

Fakete, S.R.(1987).The new system for the evaluation of potato energy. proceeding.1st North.American congress-Oct.10-13,Por.Hand U.S.A.

Gull, S.D.; F.M. Isenberg and H.H.Bryan (1970).Alkaloid toxicology of Solanum-tuberosum. Hort. Science,5: 316.

Hansen,A.A.(1985).Two fatal cases of potato poisoning.Science,61:340 - 341.Harinder P., H.P.S. Makkar and K.M.Becker,(2008). increase synthesis of protein from urea supplemented during silage making. Eur.J.Lipid Sci.Technol.111:773-787.

Hoek ,A.E . ; A.G. Lemmens;J. W. M. A. Mullink and A.C.Beynen.(1988) .Influence of dietary calcium:phosphorus ratio on mineral excretion and nephrocalcinosis in female rats. J. of Nutiration .118: pp.1210-1216.

Jadhav, S . J .; R . P . Sharma , and D.K . Salunkhe (1981). Naturally occurring toxic alkaloids in foods. Crit. Rev.Toxicol., 9 : 21 – 104 .

Khalifa , H.A.A.(1972) . Effect of low of coarse roughage supplement on the rumen fermentation of sheep . Sudan .J.Vet. Sci. Anim. Husb. , 13 : 11.

Kurihara , Y. ; J.M. Eadie ; P.N.Hobson and S.O. Mann (1988)Relationship between bacteria and cillate protozoa in sheep rumen.j. Gen.Microbial, 51: 267-278 .

Ling, E.R.(1963).Text Book of Dairy Chemistry, Vol.11. Practical Champ man and Hill , London .3 rd Ed.

Linne, J.J. and K.M.Ringsrud (1992). Basic Techniques in clinical Laboratory Science .3rd Ed., Mosby year book.

Mann,S.O.(1968).An improved methods for determining the cellulolytic activity in anerobic bacteria. J. Appl. Microbial ,7:231-241 .

Miller,S.E.and J.M.Weller (1971).Textbook of Clinical Pathology. 8th Ed. The Williams and Wikins Co., Baltimore Scientific Book. Agency. Calcutta.

Mohammed,A.H.;k.Ibrahim and H.El-Amary(2003).Laincorceration aromatic plants by-products in rumenant diets.rumen fermentation and performance Egyptian J . Nutrition and feeds 7 : 186 - 197.

Monnet , L.(1963). Determination uf bilirubin Animal Biol. Clin ., 21: 717.

Morris, S.C. and T.H.Lee (1984). The toxicity and teratogenicity mutagens. Mutat. Res., 89: 95 - 136.

Murdoch,J.(1992).Making and feeding silage.Farming Press Books,LTD,Lond.

Nour , A. M. ; A .E.Tag El -Den ; S.M. Zahran and M.H . Ahmed (1989) . Effect of feeding Agro – industrial by - products on total and differential protozoal counts in the rumen .Third Egyptian – British Conference on Animals Products . Alexandria, 7-10 October, 91 -101 .

NRC (1981).Nutrient Requirements of Domestic Animals. Nutrient Requaierments of Goats. National Research Council, Washington, D.C. USA of Official Analytical Chemists, Washington, D.C.,USA

Parfitt,D.E.; Peloquine; S.J.and N.A.Jorgensen (1982).The nutritional value of pressed potato vine silage American Potato Journal, 59:415-423.

Patil, B.C. ; R.P. Sharma ; D.K. Salunke and K. Salunkhe (1972).Evaluation of TGA toxicity. Food Cosmet. Toxicol., 10: 395 - 398.

Patton,C.J.and B.C.Crouch (1977).Spectrophotometeric and kinetics investigation of the berthelot reaction for the determination of ammonia. Anal. Chem., 49: 464 - 469.

Pollman,D.S.and D.M.Danielson(1980).Enhancement effect to thehumoralimmune response on blood cells. Potato Journal,59:415 - 423.

Renwick, J.H.; W.D.B.Claringbold ; M.E. Earthy ; J.D.Few and A.C.S.Mclean (1984). Neural-tube defects produced in Syrian hamsters by potato glycoalkaloids. Teratology, 30: 371- 381.

Reitman, S. and S.Frankle (1957). Amethod for determination of plasma GOT and GPT. Am. J. Clin. Path., 28: 108.

Robb J.G.; R.C.Labenl ;J.r. Walker and V.Herring, (1994) . Ether extract digestibility of nutrient digestibility by goats fed discarded potato silage and hay .effect of total glycoalkaloids in potato tuber and discarded parts in dairy goats rations. Journal of Dairy Science 57: 443-449.

Saleh, M.R.M.and A.A.Abd El-Aziz(2007).Potato by-products as animal feed On milk production and milk constituents and their effects on perfo-rmance of Rahmany ewes.J.Agric.Sci.Mansoura Univ.,32:4235-4245.

Saleh,M.R.and A.A.Abd-Elmordy (2008).Potato by-products as animal feed. feed 2- some rumen parameters . *J. Agric. Sci. Mansoura Univ., 33(5): 3201 3210, 2008* .

Saleh, M. R., Abd- Elmordy, Khalifa, E.I. and El-Emam, G.I.(2009). Potato by-products as animal feed. Effect of total glycoalkaloids on hematology and blood bio-chemical and constituents in small ruminants.Egypt.J. Appl. Sci., Zagazic,Univ., (8A) :13-29.

SAS Institute (2003).SAS/STATR User's Guide: statistics. Ver. 9.1, SAS Institute Inc., Cary, NC, USA.

Schmeider, B. H. and W.P. Flatt (1975). The Evaluation of Feeds throw the Digestibility Experiment.The University of Georgia Press,Athens,415 p.

Schultz, T.A. and E. Schultz (1970). Estimation of rumen microbial nitrogen by three analytical methods. J. Dairy Sci , 53:781.

Sharma, R.P. and D.K Salunkhe (1981).Naturally occurring toxic alkaloids in foods. Crit. Rev.Toxicol., 9 : 21-104 .

Sony,V.K.andD.D.Sharma(1982).Enfluence of levels of concentrate feeding on the microbial population in goat rumen Indian.j.Anim.Sci.,52(9):821.

Sultan , B.E. (1995). Studies on the effects of introducing chemically treated roughages in the feeds of farm livestock. M.Sc. Thesis , Fac. of Agric., Mansoura Univ.

Warner, A.C.I.(1964). Production of volatile fatty acids in the rumen, methods of measurements. Nutr. Abst. & Rev., 34: 339.

Weichselbaum,M.H.(1989).Colorimetric determination of total protein.Anim.J. PATH.,16:40.

تأثير القلويدات القاعدية الطبيعية فى درنات البطاطس المستبعدة والعروش على انتاج اللبن وبيئة الكرش فى الماعز الزرايبى الحلابة .

مصطفى راشد محمد صالح

معهد بحوث الإنتاج الحيوانى – مركز البحوث الزراعية – دقى - مصر .

أجريت هذه الدراسة بمحطة بحوث الإنتاج الحيوانى بالسرو – مركز البحوث الزراعية - يوليو 2012م .استهدفت الدراسة معرفة تأثير القلويدات الكلية القاعدية الضارة ذات التأثيرالسام الموجودة طبيعيا فى الدرنات المستبعدة والضامرة وذات البقع الخضراء غير الصالحة للغذاء الأدمى على إنتاج اللبن وتركيبيه فى الماعز الزرايبى الحلابة0أستخدم فى هذه الدراسة عدد 24 من الماعز الزرايبى الحلابة عمر 30- 36 شهرا وتزن فى المتوسط 76و41 كجم قسمت عشوائيا إلى ثلاثة مجاميع متساوية (8 حيوانات بكل معاملة).غذيت وفقا لمقررات NRC (1990) كالتالى : المجموعة الأولى غذيت على عليقة تحتوى على50 %علف مركز +50% دريس برسيم (مقارنة) ، المجموعة الثانية 50% علف مركز + 50% سيلاج الدرنات المستبعدة والعروش ، المجموعة الثالثة غذيت على 50% علف مركز + 50% دريس العروش وبعض الدرنات المستبعدة والضامرة.

أوضحت النتائج أن مستوى القلويدات الكلية القاعدية (تى جى إيه) فى العلائق واللبن والروث والبول سجلت انخفضا واضحا مع معاملة السيلاج مقارنة بمعاملة دريس البطاطس. كما أوضحت النتائج أن السيلاج أعطى جودة عالية حيث إنخفضت قيم الـpH والأمونيا، بينما ارتفع كلا من حامض اللاكتيك والأحماض الدهنيه الطياره0 كما أدت عملية السيلجة إلى رفع محتوى السيلاج من البروتين والكربوهيدرات مع انخفاض الألياف الخام والرماد مقارنة بدريس البطاطس. وقد وجد أن إنخفاض ال ـ تى جى إيه فى السيلاج أدى إلى زيادة الإستفادة من الأملاح المعدنية بالجسم . أما المركبات الكلية المهضومة (الـ تى دى إن) سجلت أعلى القيم مع مجموعة المقارنة يليها مجموعة السيلاج ثم مجموعة الدريس على التوالى . كانت(63.3 ، 61,2، 69.4%)لكل من الكنترول، وسيلاج البطاطس، ودريس البطاطس على التوالي 0 بينما كانت قيم (DCP 10.80,10.30، 9.49 %)لكل من المجاميع المذكورة وبفرق معنوى على مستوى (5%) مما يوضح تفوق مجموعة السيلاج على مجموعة دريس البطاطس0 بالنسبة للغذاء المأكول وجد إختلافا معنويا على مستوى (5 %) بين مجموعة السيلاج ومجموعة دريس البطاطس 0وكانت القيم 1510،1495، 1540 جم / الرأس / اليوم لكل من الكنترول، وسيلاج البطاطس، ودريس البطاطس على التوالى. وأكدت النتائج زيادة كمية الماء المشروب لمجموعة دريس البطاطس عن المجموعات التجريبية الآخرى.أما بالنسبة لمحصول اللبن بينت النتائج تفوق مجموعة السيلاج على مجموعة الدريس بفرق معنوي على مستوى (5 %) لإرتفاع محصول اللبن بها، وكانت القيم كالتالي 1417، 1451،

1376 جم/رأس/اليوم وكذا المواد الكلية الصلبة ، الدهن، المواد الصلبة أللآدهنية ، البروتين الكلى أما اللاكتوز فقد إنخفض بمستوى معنوى (5%) . من الـ آيه دى اف ، ان دى اف ، ايه دى ال ، الهميسيلولوز والسيلولوز إنخفاضا معنويا على مستوى (5%) فى سيلاج البطاطس ، بينما إرتفعت كل هذه القيم مع دريس البطاطس ودريس البرسيم .وأوضحت النتائج أن دريس البطاطس كان منخفض معنويا بمستوى((5%) فى الأسيتات ، والبيوترات والايزو بيوترات بينما سجل السيلاج أعلى قيمه فى محتواها من البربيونيك وأقل قيمه للنسبه بين الأستيك والبيوتريك و الفاليرات مقارنة بمجموعتى دريس البطاطس والمقارنة ، كما إرتفعت الأمونيا والأحماض الكليه الطياره إرتفاعا معنويا فى مجموعة السيلاج متبوعه بمعاملة الدريس ثم مجموعة المقارنه خلال المراحل المختلفه .أما العد الكلى للبكتريا والبكتريا المحلله للسيللوز و البروتوزوا كانت مرتفعه معنويا فى سيلاج مخلفات البطاطس خلال المراحل الزمنيه الثلاثه للتحليل مقارنة بمجموعة الدريس ومجموعة المقارنه ، ومن ناحية أخرى وجد أن مجموعة دريس مخلفات البطاطس كانت أقل المجاميع المختبره فى محتواها من كرات الدم الحمراء RBCs ، Monocyte ، بينما إرتفع محتواها من كرات الدم البيضاء WBCs ، Neutrophile ، Lymphocyte , Eiosinophile فى حين إنخفضت هذه القيم مع مجموعة السيلاج و المقارنه . من ذلك يتبين أن تأثير التغذية على مخلفات البطاطس على صورة سيلاج أفضل منه كدريس، وقد يكون إنخفاض مستوى الـ تى جى إيه فى السيلاج راجعا إلى اليوريا المضافة والتى تحولت الى أمونيا وتفاعلها مع الالقلويدات الكلية القاعدية (TGA) 0