Effects of thyme or/and celery on feed utilization, growth performance and meat quality of Barki lambs

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Introduction

- The EU and many other countries have banned the use of ionophore antibiotics in food animal production.
- Natural feed additives posses bioactives with a wide range of antimicrobial activities.
- Natural bioactives/phytochemicals have the potential to replace ionophore antibiotics use.
- Inclusion of important natural feed additives such as celery and thyme in the diet of Barki lambs was evaluated.
- Our objective was to investigate the effects of in-feed inclusion of celery, thyme or their mixture on nutrient intake, digestion, blood parameters, growth performance and meat quality of Barki lambs.

Materials and Methods

- Fifty-five Barki lambs weighing 18.5 ± 1.1 kg and about 90 ± 5 days old were randomly assigned to five experimental treatments.
- Treatments were control diet, control + 15 g thyme, control + 15 g celery, control + 15 g thyme/celery mix or 1 g salinomycin.
- The study was arranged in a completely randomized design with 11 replicates/treatment.
- We estimated DMI, nutrient intake and digestibility.
- Blood and carcass samples were collected and evaluated for some blood parameters and meat quality, respectively.

Results

Table 1
Feed intake and digestibility of diets fed to Barki sheep and supplemented with thyme, celery, their mixture or salinomycin.

	Treatment[1]					SEM	*P* value		
	Control	Thyme	Celery	Thyme-Celery	Salinomycin		Treatment (T)	Period (P)	T×P
Nutrient intake, g/d									
Concentrate	840.2	891.2	882.1	888.0	816.6	25.22	0.140	<0.001	1.000
Maize fodder	460.9^{b}	537.7^{a}	531.9^{a}	535.1^{a}	432.5^{b}	12.61	<0.001	<0.001	1.000
Total intake	1301.1^{b}	1428.9^{a}	1414.0^{a}	1423.1^{a}	1249.1^{b}	32.67	0.004	<0.001	0.999
Nutrient digestibility, g/kg DM									
DM	700.5^{b}	771.7^{a}	725.8^{b}	771.3^{a}	734.7^{ab}	18.16	0.034	0.077	0.095
OM	752.8^{b}	811.2^{a}	772.5^{b}	813.7^{a}	782.7^{ab}	15.73	0.037	0.044	0.143
CP	665.3^{b}	745.3^{a}	690.7^{ab}	740.3^{a}	684.7^{ab}	12.50	0.015	0.177	0.140
EE	557.7	564.8	554.0	568.0	571.8	34.60	0.400	0.107	0.053
NDF	582.8^{d}	657.5^{ab}	640.8^{b}	672.2^{a}	618.5^{c}	9.43	0.001	0.542	0.996
ADF	668.5^{c}	760.0^{ab}	710.2^{bc}	768.0^{a}	702.5^{c}	24.89	0.030	0.079	0.169

[1]The basal diet based on 600 g of concentrates feed mixture/kg DM and 400 g of fodder maize/kg DM with no additive (Control treatment).Means in the same row with different superscripts differ, $P < 0.05$. *P*-value is the observed significance level of the *F*-test for treatments; SEM = standard error of the mean.

Table 2
Growth performance of Barki sheep fed diet supplemented with thyme, celery, their mixture or salinomycin.

	Treatment					SEM	*P* value		
	Control	Thyme	Celery	Thyme-Celery	Salinomycin		Treatment (T)	Period (P)	T×P
Initial BW, kg	19.2	19.2	19.3	19.3	18.5	0.811	0.965	-	-
Final BW, kg	43.6b	48.1ab	51.7a	48.7ab	47.5ab	2.324	0.020	-	-
Weight gain, kg	24.5b	28.6ab	32.1a	29.5ab	29.0ab	2.034	0.013	-	-
ADG, g/d	85.1b	99.0ab	111.1a	98.3ab	98.9ab	5.29	0.017	<0.001	0.103

Means in the same row with different superscripts differ, $P < 0.05$. *P*-value is the observed significance level of the *F*-test for treatments; SEM = standard error of the mean.

Table 3
Carcass traits of Barki sheep fed diet supplemented with thyme, celery, their mixture or salinomycin.

	Treatment					SEM	*P* value
	Control	Thyme	Celery	Thyme-Celery	Salinomycin		
Live body weight (kg)	51.8	55.8	55.3	56.8	55.0	2.29	0.620
Hot carcass weight (kg)	23.5	27.6	26.6	28.5	25.2	1.51	0.207
Dressing (%)	45.4	49.3	48.1	50.2	45.9	1.5	0.170
Fat thickness (cm)	0.40^{b}	0.30^{b}	0.35^{b}	0.65^{a}	0.35^{b}	0.038	<0.001
LM area (cm^2)	17.0^{c}	26.7^{a}	20.9^{b}	21.7^{b}	19.6^{bc}	1.04	0.001
Lean (%)	52.3^{c}	57.2^{ab}	58.5^{a}	54.4^{bc}	59.7^{a}	1.08	0.001
Fat (%)	25.6^{a}	20.6^{b}	21.4^{b}	25.0^{a}	18.7^{b}	1.05	0.001
Bone (%)	22.1	22.2	20.2	20.6	21.6	0.65	0.149

Means in the same row with different superscripts differ, $P < 0.05$. *P*-value is the observed significance level of the *F*-test for treatments; SEM = standard error of the mean.

- Additives increased (P<0.05) both corn stover and total intakes.
- Thyme and thyme/celery mix increased nutrient digestibility (P<0.05) compared with the control treatment.
- Celery, thyme/celery mix and salinomycin treatments decreased serum cholesterol.
- Celery increased (P<0.05) final body weight, weight gain and average daily gain without affecting shrunk liveweight, hot carcass weight or dressing percent.
- Thyme/celery mix increased fat thickness (P<0.001), while thyme, celery and thyme/celery mix treatments increased (P=0.001) the ribeye area.
- Salinomycin, celery and thyme treatments increased (P<0.05) the lean proportion and decreased the fat proportion.
- Thyme, celery and thyme/celery mix treatments decreased (P<0.001) carcass protein, while thyme and thyme/celery treatments increased (P=0.001) carcass water holding capacity.
- Salinomycin, thyme and celery treatments decreased (P=0.002) meat brightness score, while Celery treatment increased (P<0.05) redness of meat, without affecting yellowness, chroma or hue of the meat.
- In conclusion, further studies are planned to validate results and their mechanism of action.