Abstract #: **18461**

Effects of *Ascophyllum nodosum* meal and monensin on performance and iodine metabolism in lactating dairy cows

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INTRODUCTION AND OBJECTIVES

❖ *Ascophyllum nodosum* (**ANOD**) meal is largely used as feed additive in ruminant diets.

❖ Previous research suggested that bioactive compounds of ANOD meal (e.g. phlorotannins) and microminerals (Cu, Zn, and Fe) may enhance animal health and performance.

❖ However, high iodine concentration in ANOD meal can limit its use in dairy rations.

❖ The objective of this study was to evaluate the impact of incremental amounts of ANOD meal (TASCO meal; Acadian Seaplants; Nova Scotia, Canada) on performance, markers of animal health, ruminal fermentation profile, and iodine metabolism in lactating dairy cows.

❖ We also aimed to compare the effects of ANOD against the ionophore monensin (**MON**) on the same variables reported above.

MATERIAL SAND METHODS

❖ The study was conducted at the University of New Hampshire Fairchild Dairy Teaching and Research Center.

❖ Five ruminally-cannulated lactating Jerseys cows (102 ± 15 DIM and 27.7 ± 2.8 kg/d of milk yield) were randomly assigned to 1 of 5 dietary treatments: 0 g (negative control), 57 g, 113 g, or 170 g of ANOD meal or 300 mg of MON (positive control) in a 5 × 5 Latin square design.

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MATERIAL AND METHODS

- Treatments were administered daily placed directly in the rumen after the morning feeding.
- Each experimental period lasted 28 d with 21 d for diet adaptation and 7 d for data and sample collection.
- Milk yield was recorded daily and milk samples collected monthly for 4 consecutives milkings, pooled by cow per period, and analyzed for components using mid-infrared reflectance spectroscopy.
- Spot urinary and fecal grab samples were collected with markers used to estimate urinary volume (creatinine) and fecal output of DM (indigestible ADF).
- Blood sample was collected approximately 4h after the morning feeding.
- Milk, feces, urine, and serum were analyzed for iodine using inductively coupled plasma mass spectrometry.
- Degrees of freedom for treatment were partitioned into 4 single-degree-of-freedom non-orthogonal contrasts: linear, quadratic, ANOD diets vs. MON diet, and 170 g ANOD diet vs. MON diet.

Table 1. Ingredient and chemical composition of the experimental diet.

Item	TMR, % DM
Ingredients, % of DM	
Corn silage	25.5
Haylage	40.8
Corn meal	20.9
Soybean meal	7.50
Roasted soybean	3.52
Minerals & vitamin premix	1.83
Chemical composition, % DM	
DM, % of fresh matter	50.7
CP, %	15.8
aNDFom, %	37.3
ADF, %	24.8
iADF, % ADF	7.44
NFC, %	34.6
Starch, %	22.9
TDN, %	70.4

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RESULTS

Table 2. Effect of *Ascophyllum nodosum* (ANOD) meal or monensin on performance, milk composition, and urinary excretion of purine derivatives in lactating dairy cows.

	Treatments					SEM	Contrast (*P-value*)			
	ANOD meal						ANOD meal			
Item	0 g	57 g	113 g	170 g	Monensin		Linear	Quadratic	Monensin vs ANOD	Monensin vs 170 g ANOD
DMI, kg/d	20.1	19.8	19.7	19.8	19.2	0.60	0.48	0.61	0.10	0.17
Milk yield, kg/d	20.8	20.1	19.9	20.8	20.2	0.58	0.76	0.005	0.65	0.10
4% FCM, kg/d	22.7	22.1	22.2	22.6	23.1	0.64	0.84	0.14	0.05	0.32
ECM, kg/d	24.4	23.8	23.7	24.2	24.5	0.68	0.72	0.12	0.14	0.56
Milk fat, %	4.66	4.66	4.80	4.61	5.01	0.06	0.85	0.001	<0.001	<0.001
Milk fat, kg/d	0.96	0.94	0.95	0.95	1.00	0.02	0.89	0.04	0.002	0.02
Milk protein, %	3.59	3.62	3.62	3.55	3.64	0.11	0.07	0.004	0.01	<0.001
Milk protein, kg/d	0.74	0.73	0.71	0.73	0.72	0.02	0.33	0.05	0.50	0.22
Lactose, %	4.71	4.68	4.70	4.69	4.71	0.05	0.72	0.35	0.19	0.35
Lactose, kg/d	0.98	0.94	0.94	0.97	0.95	0.02	0.69	0.01	0.93	0.23
Milk TS, %	13.9	13.9	14.0	13.8	14.2	0.18	0.96	0.002	<0.001	<0.001
Milk TS, kg/d	2.80	2.76	2.78	2.75	2.72	0.10	0.46	0.99	0.41	0.70
Milk SCC, x 1,000 cells/mL	18.1	21.5	25.5	17.4	23.4	2.86	0.53	<0.001	0.01	<0.001
MUN, mg/dL	10.3	9.7	10.4	10.5	11.1	0.66	0.06	0.04	<0.001	0.01
Urinary purine derivatives, mmol/d	123	126	125	127	128	10.8	0.79	0.92	0.81	0.89

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RESULTS

Table 3. Effect of *Ascophyllum nodosum* (ANOD) meal or monensin on iodine output and serum concentrations of iodine and T_3 and T_4 in lactating dairy cows.

	Treatments					SEM	Contrast (*P-value*)			
	ANOD meal						ANOD meal			
Item	0g	57g	113g	170g	Monensin		Linear	Quadratic	Monensin vs ANOD	Monensin vs ANOD 170 g
Total iodine intake, mg/d	8.60	28.7	48.6	68.9	10.4	2.34	<0.001	0.95	<0.001	<0.001
Iodine intake ANOD, mg/d	0.00	20.3	40.3	60.6	0.00	2.32	<0.001	1.00	<0.001	<0.001
Milk iodine, mg/d	7.30	14.4	19.5	24.6	6.1	1.77	<0.001	0.54	<0.001	<0.001
Fecal iodine, mg/d	20.5	48.1	60.6	86.6	21.1	7.76	<0.001	0.91	0.0002	<0.001
Urinary iodine, mg/d	4.30	13.0	15.3	22.3	6.3	1.92	<0.001	0.66	0.0002	<0.001
Serum iodine, ng/mL	106	208	304	363	109	20.2	<0.001	0.09	<0.001	<0.001
Serum T_3, ng/mL	1.08	1.03	1.01	0.97	1.02	0.07	0.27	0.97	0.79	0.57
Serum T_4, ng/mL	40.6	40.5	43.4	39.1	43.0	3.30	0.88	0.41	0.49	0.27

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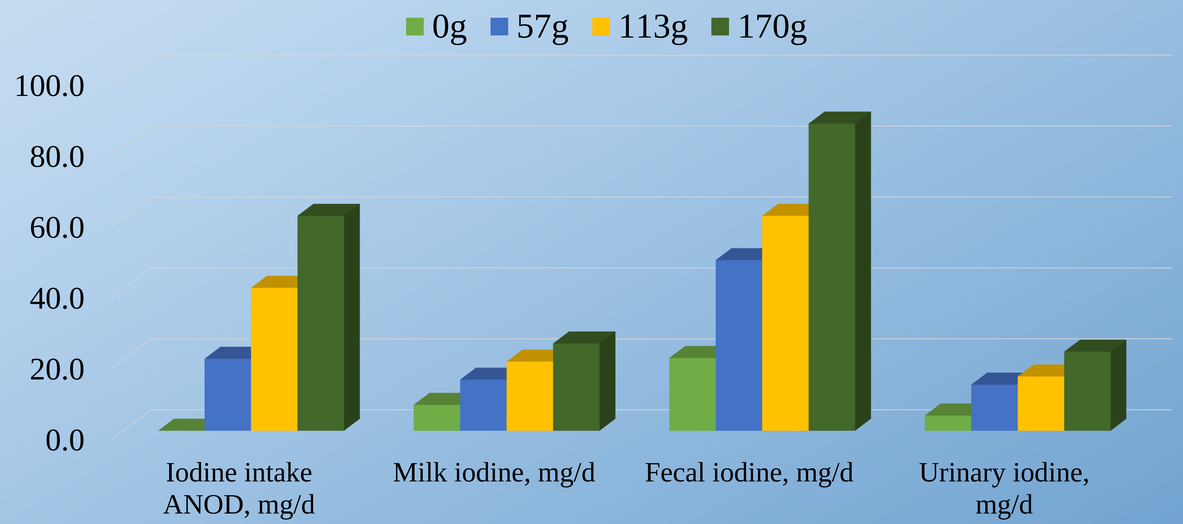

Figure 1. Iodine excretion in lactating dairy cows fed incremental amounts of *Ascophillum nodosum* meal.

CONCLUSION

- ANOD supplementation linearly increased the concentration of iodine in serum, and the output of iodine in milk, feces, and urine.
- Feeding MON improved concentration and yields of milk components compared with ANOD.

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