ALOE VERA BY-PRODUCTS AS POTENTIAL ENERGY SOURCES

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Story in Brief

Two experiments were conducted to evaluate the potential energy value of 4 Aloe Vera by-products. The addition of by-product to broiler rations did not impact body weight gain, but generally depressed feed efficiency. In vitro dry matter disappearance of the by-products was high averaging 90% disappearance while solubility averaged 29% suggesting a significant microbial fermentation.

[Key Words: Aloe Vera, By-Products, Poultry, Ruminants.]

Introduction

Thousands of tons of Aloe Vera by-products are produced in Oklahoma annually. These products are normally discarded after the juice is squeezed out of the leaves. However, the remaining residue may contain useable energy for livestock classes. The following study was conducted to estimate the energy value of 4 Aloe Vera by-products.

Materials and Methods

To estimate the feeding value for animals with limited microbial digestion, the chick was utilized as the experimental model. Arbor Acres x Vantress broiler chicks were weighed and allotted to ten treatment groups at random such that each group was replicated 3 times with 12 chicks per replicate. Birds were housed in electrically heated batteries for the duration of the two week experiment. All additions to the basal diet (Table 1) were made by dilution to the desired level. Feed and water were available continuously. Bird body weight gain and feed consumption were tallied at the end of the two week feeding period.

To estimate the feeding value of the by-products in animals with extensive fermentation processes, in vitro dry matter disappearance was determined.

Results and Discussion

Body weight gain, feed consumption and feed efficiency are summarized in table 2. In this study, no significant impact of by-products upon body weight gain was detected. Birds were able to increase diet consumption to offset the decline in nutrient density which apparently accompanied by-product addition. Feed efficiency declined linearly

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Table 1. Treatments.

1	Poultry Ration
2	Aol + .3% pulp with aloin
3	Aol + 1% pulp with aloin
4	Aol + 3% pulp with aloin
5	Aol + .3% pulp
6	Aol + 1% pulp
7	Aol + 3% pulp
8	Aol + 5% waste leaves cooked
9	Aol + 10% waste leaves cooked
10	Aol + 5% waste leaves uncooked
11	Aol + 10% waste leaves uncooked

*All by-products were dried prior to evaluation to reduce the possibility of mold growth. Dietary additions are on a dry matter basis.

Table 2. Average Live Body Weight, Gain, Feed Consumption, Feed Efficiency and Feed Efficiency Corrected By-Product Consumption.

Treatment	Gain (g)	Feed Consumption (g)	Gain/Feed	Gain/Adj Feed[1]
1	61	111	.55[a]	.55
2	55	110	.50[ab]	.50
3	56	110	.51[ab]	.51
4	54	113	.48[b]	.49
5	59	104	.57[a]	.57
6	55	107	.51[ab]	.52
7	55	108	.50[ab]	.53
8	54	105	.51[ab]	.54
9	55	109	.50[ab]	.56
10	54	109	.50[ab]	.52
11	56	112	.50[ab]	.56

[1]Feed efficiency corrected for by-product consumption.

[2]Means within a column with unlike superscripts significantly diff. (P<.05).

(P<.05) with increasing levels of by-product. The by-products examined have a poor feeding value for poultry and other animals with limited microbial digestion capacity. Toxicity of the products at the levels examined appears slight though rations containing high levels of aloin may be of concern.

The in vitro disappearance values are shown in table 3. Contrary to the poultry experiment, data collected from this phase of the study

Table 3. In vitro dry matter digestibility of 4 cosmetic specialities aloe vera by-products.

	Digestibility (%)
pulp with aloin	94.6^{a}
pulp without aloin	88.6^{ab}
cooked waste leaves	88.9^{ab}
uncooked waste leaves	85.9^{b}

^{ab}Means with unlike superscripts significantly differ ($P<.05$).

Table 4. In vitro dry matter solubility of 4 cosmetic specialities aloe vera by-products.

	Solubility (%)
pulp with aloin	20.7^{b}
pulp without aloin	50.2^{a}
cooked waste leaves	25.0^{b}
uncooked waste leaves	19.4^{b}

^{ab}Means with unlike superscripts significantly differ ($P<.05$).

Table 5. By-product composition (dry matter basis).

	pulp with aloin	pulp	cooked leaves	uncooked leaves
Dry Matter	1.6	3.8	9.7	4.4
Crude Protein	4.0	5.7	7.3	4.8
Acid Detergent Fiber	46.7	23.8	39.1	49.4
Neutral Detergent Fiber	31.4	19.6	34.0	34.0
Ash	15.0	14.9	12.6	13.1

Means within a row with unlike superscripts significantly differ ($P<.05$).

are encouraging as disappearance averaged 90%. This would imply that the products would be extensively fermented by microorganisms in the ruminants digestive tract. A second study conducted to characterize digestible constitutents through solubility (Table 4) indicated that solubility was low for all the by-products except pulp without aloin suggesting that the in vitro values do indeed represent, at least in part, a significant microbial digestion. By-product analysis (Table 5) indicates that principle constituents are fibrous components and that protein is quite low. Ruminants fed the product exclusively would not perform well. However, it should be possible to benefit from the by-products fermentable energy content.

One concern regarding the utilization of the by-products is the high moisture content. Drying the products prior to feeding would most likely not be cost effective. Alternatives include feeding the material fresh or ensiling prior to feeding.