

# Aspects Regarding the Gross Chemical Composition and Fatty Acids Content of Some By-Products Obtained from the Biofuel Industry

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## **Abstract**

Samples of by-products, obtained from the production of biofuels were collected. These products were introduced in different proportions in feed rations of fattening lambs. Gross chemical composition of feed was analyzed and compared with mean reference values. Ash and cellulose content does not influence the results. The percentage of raw protein, specific for each feed, is correlated with the body weight gain. Fat quantity of rape meal is the closest to that of granulated feed and also the highest compared with the other groups, so that it can justify the higher productive performance achieved by group 1, who received rape meal in ratio. The concentration of fatty acids was determined from analyzed feed after oils extraction, their saponification and their reading with a HPLC. The data showed that the fatty acid level is relatively close to that specified in the literature. Euricic acid, that is responsible for the toxic potential of the rape, has been found in rape meal.

**Keywords:** biofuels, by- products, toxic potential

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## **1. Introduction**

Biofuel industry has gained amplitude lately due to the necessity of finding new energy sources due to the decrease of the hydrocarbons deposits. Part of residues of this industry may be directed to the animal feed. [1- 4]

These products may contain varying proportions of natural substances with toxic potential (tioglucozids, euricic acid - omega-9 monounsaturated fatty acid - in Rape meal), toxic substances of industrial nature (aldehydes, methanol, laughing gas, different isomers), and some with complex chemical composition, can contain a mixture of toxic substances (aqueous solution which collects glycerol). Because of the various raw materials used to produce biofuels

implications on health status must be known and monitored. [5- 9]

The aim of this study is to analyze the gross chemical composition and fatty acids content of some by-products obtained from the biofuel industry.

## **2. Materials and methods**

Analyzed feed was given in feed of 100 lambs divided in 4 homogeneous. Groups receiving a supplement consisting of products obtained from the manufacture of biofuels in the area (5% rape meal, 8% soybean meal and 10% sunflower meal). The results were compared with a control group receiving granular commercial feed specific for age and production category of the animals. The following parameters were determined:  
-gross chemical composition of feed (Crude ash %, by a burningly method, Crude protein % - EN.ISO 5983-2 and AOAC 2001.11, Crude fat %,

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AOAC 920.39 and AACC 30-25- Crude cellulose %- AOAC 978.10, AACC 32-10, AOCS Ba 6-84 ; -concentration of fatty acids in feed (oleic ac., linoleic ac., euristic ac.) using HPLC.

### 3. Results and discussion

Gross chemical composition of feed was analyzed and compared with the average reference values (Table 1).

Ash and cellulose content pose no special problems in the sense of influencing the results. The percentage of crude protein, specific to each sort of feed was correlated with body weight gain rate.

The amount of fat in Rape meal is the closest to that of granulated feed and also the highest compared with the other groups, justifying the

higher productive performance achieved by the group 1.

The concentration of fatty acids in feed was analyzed by using HPLC, after oil extraction and saponification (Figures 1 - 4 and Table 2).

The data presented in Table 2 show that the fatty acids are relatively close compared to the literature. Euristic acid, responsible for the toxic potential of rape, has been found in Rape meal.

Analyzis were performed from the samples of feed represented by the by-products obtained from the biofuel industry and granulated feed for lambs. Dosages were made also from the fat extracted from each category of feed. Although the obtained values are close to those from literature it is recommended to be used with caution because other factors from the chemical composition may have undesirable effects.

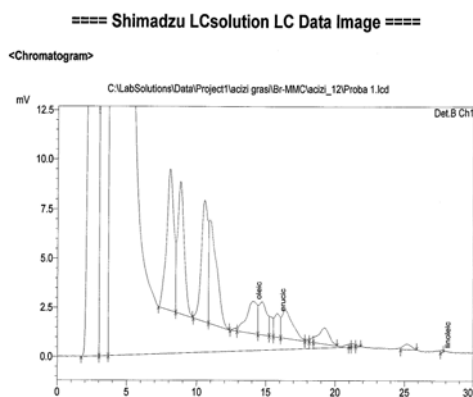
**Table 1.** Gross chemical composition of feed

No.	Sort of feed	Crude ash (%)	Crude protein (%)	Crude fat (%)	Crude cellulose (%)
1	Rape meal	6,95	25.28	17.09	9.13
2	Soy meal	6,30	40.78	8.17	7.14
3	Sunflower meal	6,27	23.75	13.22	19.78
4	Granular feed	5,96	17.53	16.46	6.59

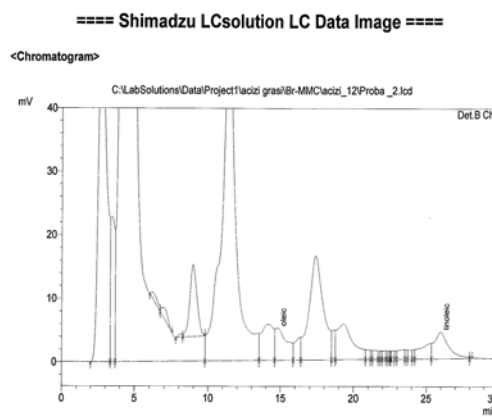
**Table 2.** Fatty acids concentration (%) determined using the cromatography

No. of sample	Name of sample	Oleic acid, %	Linoleic acid, %	Euristic acid, %
1	Rape meal	2.20	2.84	6.97
	Oil extracted from rape meal	41 (40-45) *	17 (15-20) *	13 (10-15) *
2.	Sunflower meal	6.72	3.15	-
	Oil extracted from sunflower meal	45.3 (44-46*)	30 (28-35) *	-
3.	Soy meal	1.82	4.11	-
	Oil extracted from soy meal	22.5 (20-25) *	50.4 (48-52) *	-
4	Granulated feed	1.2	0.9	-
	Oil extracted from granulated feed	5.45	7.21	-

\* In parentheses are reference values from literature for that type of oil.



**Figure 1.** Cromatogram for rape meal



**Figure 2.** Cromatogram for soy meal

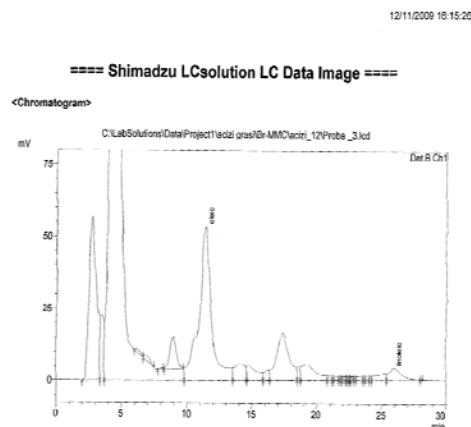


Figure 3. Chromatogram for granulated feed

#### 4. Conclusions

European requirements impose the participation in a high proportion of biofuels and the residues from their production will still be present on the market in increasing amounts. Exceptional gross chemical composition of these products (large amount of protein and fat) and relatively low cost prices (especially of rape meal), requires the use of these products in animal feed. However they require further study on their characteristics in alimentary terms in order to optimize their use to maintain animal health, and to achieve maximum zootechnical benefit. The toxic potential of by-products have to be monitored. It is recommended the usage of some low-toxin varieties (especially rape) and compliance with the recommended proportions of inclusion in feed.

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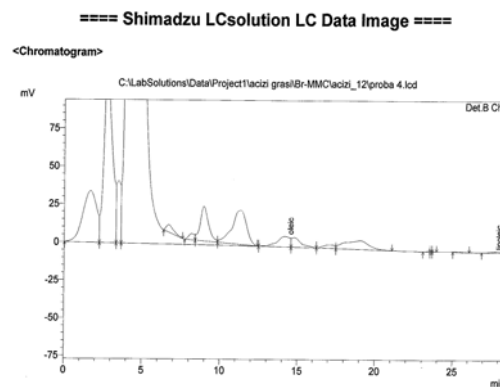


Figure 4. Chromatogram for sunflower meal

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