Evaluation of Camelina Meal as a Dietary Source of Polyphenol for Dairy Cows

Veronica S. CHEDEA^{*1)}, Rodica Ș. PELMUȘ¹⁾, Smaranda TOMA^{1,2)}, Ionelia ȚĂRANU¹⁾,
Horia GROSU^{1,2)}, Cătălin DRAGOMIR¹⁾

¹⁾ National Research Development Institute for Animal Biology and Nutrition Balotești (IBNA), 1
Bucharest Road, Balotești, Ilfov 077015, Romania

²⁾ University of Agronomic Sciences and Veterinary Medicine, 59 Mărăști Blv., 011464 Bucharest,
Romania

*Corresponding author, email: chedea.veronica@ibna.ro

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Abstract

The aim of this study was to determine, through the polyphenols content in plasma, the short-term effects of replacing the more classical sunflower meal with camelina meal in a diet for dairy cows in a low-input system. A preliminary feeding trial was organised on 16 dairy cows, randomly distributed in two groups (control vs camelina meal). The total polyphenols from plasma, feed compound and camelina meal were determined by the Folin–Ciocalteu method. In comparison with control, the total polyphenol content was higher in the diet containing camelina (275.67 ± 15.19 mg gallic acid equivalents (GAE)/l vs 189.37 ± 8.67 mg GAE/l). In the plasma of cows fed with camelina diet 12.31 ± 7.17 mg (GAE)/l were found, but in the plasma of the control group fed with the regular diet no polyphenols were detected. The camelina meal included in the diet had 2655.27 ± 36.56 mg GAE/l polyphenols. Our analysis show the presence of polyphenols in plasma of the cows fed with camelina meal enriched diet. The ratio of polyphenol absorption from the feed was 1:23. These results open new perspectives in studying the effect of camelina polyphenols on cattle metabolism.

Keywords: *camelina meal, cows' feed, plasma polyphenols*

Introduction. Camelina meal results from pressing camelina seeds, representing the co-product of this oil extraction (Moriel *et al.*, 2011). Camelina meal is a good source of protein and polyunsaturated fatty acids (PUFAs) (Bonjean and Le Goffic, 1999; Hurtaud and Peyraud, 2007) and several studies present the results of using camelina meal diet in cattle and pig (Capellozza *et al.*, 2012; Lefter *et al.*, 2013). To our knowledge, up to date, no studies on camelina meal polyphenol enriched diet have been done.

Aims and objectives. The aim of this study was to determine, through the polyphenols content in plasma, the short-term effects of replacing the more classical sunflower meal with camelina meal in a diet for dairy cows in a low-input system.

Materials and methods.

Trials on cattle feeding with camelina meal at IBNA farm. The trial was organized in a monofactorial experimental design and aimed to estimate the bioavailability, of camelina meal polyphenols in blood plasma. 16 dairy cows were distributed randomly in two groups (control vs camelina meal). The two groups received a basal diet consisting, per day, in 40 kg fresh Sudan grass, 3 kg of alfalfa hay, and 4 kg wet beer draff, completed with 6.7 kg on-farm produced concentrate mixture: corn grains 51.8%, wheat bran 12.9%, sunflower meal 31%, salt 1%, vitamin-mineral premix 1% and calcium carbonate 2.2%. The difference between diets was that sunflower meal (10% in the whole diet, DM basis) was half

Tab. 1. Total polyphenol content from camelina meal, feed compound including or not camelina meal and from the cattle blood plasma, as determined by the Folin-Ciocalteu method.

Sample	Total polyphenols (GAE/l)
Camelina meal	2655.27±36.56
Diet without camelina meal	189.37±8.67
Diet with camelina meal	275.67±15.19
Blood plasma from the cows' fed without camelina meal	0.00
Blood plasma from the cows' fed with camelina meal	12.31±7.17

replaced by camelina meal in the experimental group (15.5 % sunflower meal and 15% camelina meal). After two weeks of feeding, blood samples were collected from each cow, plasma separated by centrifugation and stored at -80 °C until the analysis were performed.

Polyphenols extraction and determination of the total phenolic content. The polyphenols from feed compound and the camelina meal were extracted in acetone 80% for 24 hours at 37°C under continuous shaking, and from cows' plasma with methanol at room temperature.

The content in total phenolic compounds of the extracts was determined by the Folin–Ciocalteu method, adapted to a microscale (Arnous *et al.*, 2001). The results were expressed as gallic acid equivalents (GAE)/l.

Results and Discussion. It has been shown that camelina meal is a good source of protein (Bonjean and Le Goffic, 1999) and PUFA (Hurtaud and Peyraud, 2007). This study proves that it is also a good source of polyphenolic compounds; thus, the camelina meal included in the diet of dairy cows had a concentration of 2655.27±36.56 mg GAE/l polyphenols (Tab. 1). In comparison with control, the total polyphenol content was higher in the diet containing camelina (275.67±15.19 mg GAE/l vs 189.37±8.67 mg GAE/l) as well as in the plasma of cows fed with camelina diet (12.31±7.17 mg GAE/l). In the plasma of the control group fed with the regular diet no polyphenols were detected.

Conclusion. Our analysis show the presence of polyphenols in plasma of the cows fed with camelina meal diet. The ratio of polyphenol absorption from the feed was 1:23. The results of this study open new directions for evaluating the effect of camelina polyphenols on cattle metabolism.

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