Characterization of organic soybean by-product (okara) as a protein supplement in organic fattening of calves

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The use of by-products in organic fattening of calves could be interesting from different points of view:

1) The EU organic regulation implies the limitation of concentrate use in fattening calves diets.
2) From an economic point of view the increase in prices of cereals and soybean force the farmers to find alternative sources of protein supply.
3) Organic systems are intend to achieve high sustainability. The use of by-products reduces residues and closes matter cycles.

The aim of this study is to characterise the achieved by product (okara) after extracting the milk from organic soybean in order to use in diets of fattening calves.

METHODOLOGY

OKARA VALUES

• 18 samples of Okara by-product from a organic soybean milk producer were sampled at farm from 2009 to 2011 each 45 days approximately.

• Dry matter (DM), ash, ether extract (EE) and protein (CP:N x 6.25) contents were determined according to the AOAC methods (A.O.A.C, 1999). Neutral-detergent fibre (NDF) and acid-detergent fibre (ADF) analyses were carried out by following the sequential procedure of van Soest et al. (1991).

•*in vitro* gas production technique: 600 mg of the substrate were weighted and filled in the bottles and were inoculated with 80 ml of the inoculum (rumen liquid from 3 cows mixed with buffer and macro mineral solutions). Bottles were incubated at 39°C and were shaken after each reading (2, 4, 6, 8, 10, 12, 24, 48, 72 h).

USE OF OKARA

• 4 Fattening batches under organic production from 2009 to 2011
• 20 Females/batch from local breed (*Bruna dels Pirineus*) and crosses with Limousin.
• Two feeding stages based in OKARA (OKA), oat hay (OAT: 88% DM; 6% CP;2% EE), and concentrate (CONC:90% DM; 12.5% CP; 5% EE)

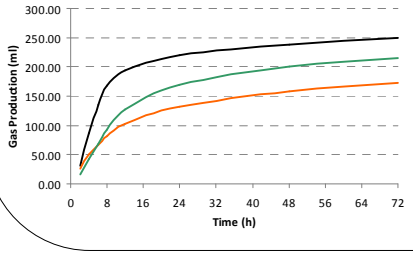
STAGE 1: From weaning around 250 kg LW (200 days of age) till 350 kg LW → Total mixed ration (TMR): 15% OKA; 55% OAT; 30% CONC
STAGE 2: From 350 kg LW till slaughter day at around 450 kg LW → TMR and CONC ad libitum

• Weight of calves monthly, ANOVA using PROC GLM of SAS including BREED, STAGE, AGE and BATCH.

OKARA VALUES

	Mean		Standard deviation
Crude Protein	29.5	±	5.6
Crude Fat	14.9	±	4.2
Dry Matter	21.2	±	19.1
Ashes	4.8	±	1.3
Crude Fiber	23.2	±	5.1
Neutral Detergent Fiber	35.0	±	9.5
Acid Detergent Fiber	22.1	±	4.3

% in a DM basis. Mean of 18 samples



Gas production

	Potential cumulative (ml)	Rate (1/h)
CONC	238 a	0.167 a
TMR	167 c	0.071 c
OKARA	209 b	0.079 b

Model: y=Potcum*(1-exp(-rate*(time-lag))

USE OF OKARA

• Animals showed **high appetence** for the TMR including okara offered ad libitum (22 g TMR/kg LW in the growing phase)

• **No negative effect on intake** was detected even when okara last more than 3 weeks exposure to the air before mixing it in the TMR

• Growth of animals which received okara in their diet was a little bit lower than expected values according to the INRATION® predictions at the growing phase (0.9 kd/d from 250 kg to 350 kg) but similar to the expected values at the finishing phase (1.2 kg/d from 350-450 kg)

CONCLUSIONS

• OKARA by-product had a high level of protein and could be used in TMR for fattening of calves.
• Considering okara as a problematic (waste) by-product in the soybean milk factories, and its low price, makes this by product as an interesting alternative as a protein supplement in calves' diets.

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