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The nutritional quality of alternative types of total mixed rations differing in linseed contents measured by the in vivo method

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Abstract: The linseed total mixed ration (TMR) was a compound of maize silage, alfalfa silage, extracted grains, linseed, alfalfa hay, soybean meal, oats, vitamins, and minerals. The control TMR had a similar proportion of feedstuffs to the linseed TMR, but the linseed supplementation was compensated for by a small part (1.5 %) of Ca-salt palm oil oleic acid. The in vivo digestibilities of dry matter (DM), organic matter (OM) and gross energy (GE) were determined in metabolic trials using six wethers of the Romanovské breed. The chemical compositions of fat, crude fibre (CF), ash, neutral-detergent fibre (NDF), acid-detergent fibre (ADF) and acid-detergent lignin (ADL) were 3.6, 19.8, 8.5, 38.6, 19.1, 4.6 % in control TMR and 4.3, 17.5, 6.5, 37.0, 21.8, 4.8 % in linseed TMR, respectively. The GE values of the control TMR and linseed TMR were 19.0 and 19.5 J/g, respectively. The in vivo digestibilities of DM, OM, and GE averaged 64.6, 66.9 and 64.6 % for control TMR and 60.2, 63.5 and 61.5 % for linseed TMR, respectively. Significant differences ($P<0.05$) between the control TMR and linseed TMR in the in vivo digestibilities of DM and GE were observed.

Keywords: in vivo digestibility, linseed, nutritional quality.

OBJECTIVE

The objectives of this study were to investigate relationships among in vivo digestibilities of dry matter (DM), organic matter (OM), and gross energy (GE), including their relationships with the chemical components of two total mixed rations (TMR) differing in linseed supplementation.

MATERIAL AND METHODS

Estimated material

The animals (six wethers of Romanovské breed) were fed twice daily; the daily feed ration was 4 kg of TMR per animal.

- Linseed TMR was compound of:
  Maize silage (46 %)
  Alfalfa silage (20 %)
  Extracted grains (9 %)
  Linseed (5 %)
  Alfalfa hay (2 %)
  Soybean meal (1.3 %)
  Oats (14 %)
  Vitamins and minerals

- Control TMR was compound of:
  Maize silage (48 %)
  Alfalfa silage (21 %)
  Extracted grains (9 %)
  Alfalfa hay (2 %)
  Soybean meal (3.4 %)
  Oats (14 %)
  Ca-salt palm oil oleic acid (1.5 %)
  Vitamins and minerals

Methods

- In vivo trials.
- Determination of chemical compositions: DM, fat, CF, ash, NDF, ADF, ADL, and GE value.

Statistical analysis

Statistical analysis was conducted using GLM (General Linear Model), PROC CORR (Correlation) procedures, Scheffe´s pairwise comparisons test by GLM procedure of the SAS program (SAS Institute, 2003). Statistical significance was declared at $P < 0.05$.

RESULTS

The chemical compositions of fat, CF, ash, NDF, ADF and ADL were 3.6, 19.8, 8.5, 38.6, 19.1, 4.6 % in control TMR and 4.3, 17.5, 6.5, 37.0, 21.8, 4.8 % in linseed TMR, respectively (Table 1).

The gross energy values of the control TMR and linseed TMR were 19.0 and 19.5 J/g, respectively (Table 1).

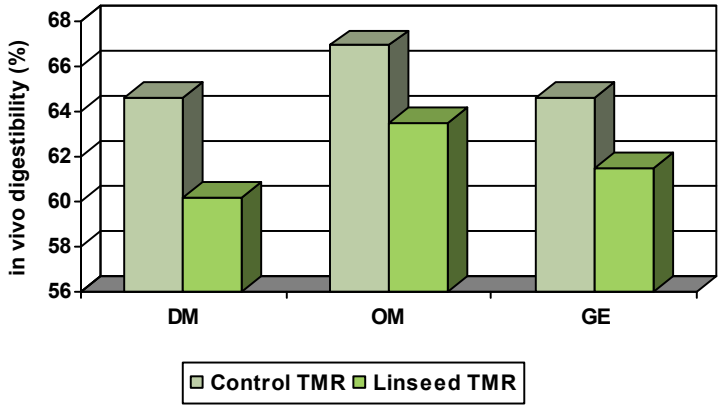
The in vivo digestibilities of DM, OM, and GE (Figure 1) averaged 64.6, 66.9 and 64.6 % for control TMR and 60.2, 63.5 and 61.5 % for linseed TMR, respectively.

Table 1
The chemical compositions of Control TMR and Linseed TMR.

Chemical compositions							
Fat (%)	**CF** (%)	**Ash** (%)	**NFE** (%)	**NDF** (%)	**ADF** (%)	**ADL** (%)	**GE** (J/g)
Control TMR							
3.6	19.8	8.5	59.2	38.6	19.1	4.6	19.0
Linseed TMR							
4.3	17.5	6.5	61.9	37.0	21.8	4.8	19.5

CF = crude fibre, NFE = nitrogen-free extract, NDF = neutral-detergent fibre, ADF = acid-detergemt fibre, ADL = acid-detergent lignin, GE = gross energy value.

Figure 1
The in vivo sheep digestibility of dry matter (DM), organic matter (OM) and gross energy (GE) of Control TMR and Linseed TMR.



CONCLUSION

Significant differences ($P < 0.05$) between the control TMR and linseed TMR in the in vivo digestibilities of dry matter and gross energy were observed.

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