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Pregnancy toxaemia prevention by feeding Sarda ewes a specific herbal extract compound

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SUMMARY – Some herbal extracts were shown to be useful in human and veterinary medicine in preventing or alleviating metabolic disorders and their consequences. The aim of the present study was to evaluate the effects of a herbal extract compound supplementation for pregnancy toxaemia (PT) prevention in dairy ewes. Thirty-three pregnant and multiparous dairy ewes were monitored during the last 40 days of pregnancy and the first 30 days in milk. The diet was given as total mixed ration and it was the same for all animals. The 33 subjects were randomly assigned to two groups, which were balanced for expected lambing date and body condition score. The treated group, consisting of 22 heads, was supplemented with 10 g/head/d of Enerphyt-Plus (Biorama, Rogeno, Milano, Italy). The remained 11 ewes were used as control group. Enerphyt-Plus was added into the total mixed ration and the treatment lasted until lambing event. Blood samples were taken and body condition score was registered during the peripartum period at 7 d intervals. Number of lambs born per ewe was recorded at lambing. Glucose, non-esterified fatty acids (NEFA), beta-OH butyrate (BHBA), and urea concentrations, as well as γ-glutamil transferase (GGT) and aspartate amino transferase (AST) activities were determined on plasma samples. Between groups, no differences were found for number of lambs born per ewe. Treated ewes showed higher ($P < 0.05$) glucose, lower ($P < 0.05$) NEFA, BHBA and GGT around lambing. Results of the present study demonstrated that the supplementation with a specific formulated phyto-derivate product was able to improve energy metabolism and liver function of periparturient dairy ewes. The reduction of PT risk in periparturient dairy ewes can have positive effects on animal welfare and performances.

Keywords: Dairy sheep, pregnancy toxaemia, herbal extract.

RESUME – *"Prévention de la toxémie de gestation en distribuant un composé d'extraits d'herbes spécifiques aux brebis sardes". Certains extraits d'herbes se sont avérés utiles en médecine humaine et vétérinaire pour la prévention ou l'atténuation de troubles métaboliques et de leurs conséquences. Le propos de la présente étude était d'évaluer les effets d'une supplémentation constituée par un composé d'extraits d'herbes pour la prévention de la toxémie de gestation (PT) chez les brebis laitières. Trente-trois brebis laitières multipares gestantes ont été suivies pendant les 40 derniers jours de gestation et les 30 premiers jours de lactation. Le régime était distribué comme ration mélangée totale, et elle était la même pour tous les animaux. Les 33 animaux ont été divisés au hasard en deux groupes, qui étaient équilibrés quant à la date d'agnelage prévue et la note d'état corporel. Le groupe traité, qui comprenait 22 animaux, était supplémenté avec 10 g/tête/j de Enerphyt-Plus (Biorama, Rogeno, Milan, Italie). Les 11 brebis restantes servaient de groupe témoin. Enerphyt-Plus était ajouté dans la ration mélangée totale et le traitement durait jusqu'à l'agnelage. Des échantillons sanguins étaient prélevés, et la note d'état corporel était enregistrée pendant la période péripartum à intervalles de 7 jours. Le nombre d'agneaux nés par brebis était enregistré à l'agnelage. Le glucose, les acides gras non estérifiés (NEFA), le butyrate beta-OH (BHBA), et les concentrations d'urée, ainsi que les activités γ-glutamil transférase (GGT) et aspartate amino-transférase (AST) étaient déterminées sur échantillons de plasma. Aucune différence n'a été trouvé entre groupes quant au nombre d'agneaux nés par brebis. Les brebis traitées avaient un glucose plus élevé ($P < 0,05$), des NEFA, BHBA et GGT plus faibles ($P < 0,05$) en période péripartum. Les résultats de la présente étude montrent que la supplémentation avec un produit phyto-dérivé spécifiquement formulé peut améliorer le métabolisme énergétique et la fonction hépatique de brebis laitières périparturientes. La réduction du risque de toxémie de gestation chez les brebis périparturientes peut avoir des effets positifs sur le bien-être et les performances des animaux.*

Mots-clés : *Brebis laitières, toxémie de gestation, extrait d'herbes.*

Introduction

Pregnancy toxaemia (PT) is a metabolic disorder of ewes that may occur in the last six weeks of pregnancy. It is caused by a lack of energy in a period when there is a high demand causing a rapid

breakdown of body tissue (Hay and Baird, 1991). Therefore, mature pregnant ewes with inadequate nutrition are susceptible and those in poor condition, or over-fat and/or with twin or multiple lambs, are most at risk. Pregnancy toxaemia is a common metabolic disease in dairy ewes farm and it is associated with losses in production efficiency and increases the susceptibility to other diseases (Lacetera *et al*., 2001).

Ewes affected by pregnancy toxaemia should be treated without delay for severe cases to be avoided. In the case of a general farm problem with pregnancy toxaemia, the feeding practices will have to be reviewed and adjusted by the organic advisors to prevent future cases. In our previous study (Bernabucci *et al*., 1998) we improved the metabolic status and reduced the incidence of subclinical PT by feeding Comisana dairy sheep with a specific formulated concentrate.

In the last years more attention has focussed on the utilization of herbal extracts as additive in animal nutrition with the aim to prevent diseases, improve animal welfare as well as reproductive and productive performances (Viegi *et al*., 2003). Moreover, some herbal extracts were shown to be useful in preventing or alleviating metabolic disorders and their consequences (Wynn, 2001) The aim of the present study was to verify if a specific herbal extract could be used to prevent and/or reduce the incidence of metabolic diseases in periparturient dairy sheep.

Materials and methods

Thirty-three pregnant, non-lactating and multiparous Sardinian dairy ewes were used during the last 40 days of pregnancy and the first 30 days in milk. The animals were fed with a total mixed ration and it was the same for all animals. The diet consisted of corn silage (1.5 kg/head/d), hay (1.0 kg/head/d) and commercial mixed feed (0.2 kg/head/d).

The 33 subjects were randomly assigned to two groups which were balanced for expected lambing date and body condition score. The treated group, consisting of 22 heads, was supplemented with 10 g/head/d of Enerphyt-Plus (Biorama, Rogeno, Milano, Italy). The remained 11 ewes were used as control group. Enerphyt-Plus was added into the total mixed ration and the treatment lasted until lambing event. Enerphyt-Plus is a mix of different herbal extracts (*Cardus marianum*, *Echinacea* spp., *Taraxacum officinale*) with addition of oligomannans from *Saccaromyces cerevisiae*.

Blood samples were taken and body condition score (BCS: five-point scale method) was registered during the peripartum period at 7 d intervals. Blood samples were centrifuged and glucose, non-esterified fatty acids (NEFA), beta-OH butyrate (BHBA), and urea concentrations, as well as γ-glutamil transferase (GGT) and aspartatoamino transferase (AST) activities were determined on plasma samples. Number of lambs born per ewe was recorded at lambing.

Data for all measured variables were analysed as repeated measures using the GLM procedure of SAS (SAS, 1999). The model used was the following:

$$Y_{ijkl} = \mu + S_i + T_j + D_k + e_{ijkl}$$

where:
Y_{ijkl} = dependent variable;
μ = overall mean of the population;
S_i = mean effect of subject (i = 1,…33);
T_j = mean effect treatment (j = 1, 2);
D_k = mean effect of day of sampling (k = 1,…5) with day as a repeated factor;
e_{ijkl} = unexplained residual element assumed to be independent and normally distributed.

Results and discussion

Number of lambs born per ewe was not different between groups (1.2 lambs/ewe). Treatment did not influence BCS and BCS losses around parturition (Fig. 1A).

Indices of energy metabolism were significantly affected by treatment. In particular, ewes

supplemented with herbal extract showed higher (P<0.05) glucose before and after lambing (Fig. 1B), and lower (P<0.05) NEFA (Fig. 1C) and BHBA (Fig. 1D) before lambing. Considering changes of the two enzymes (Fig. 2), animals treated with herbal extract had lower (P<0.05) enzymes activities particularly before lambing.

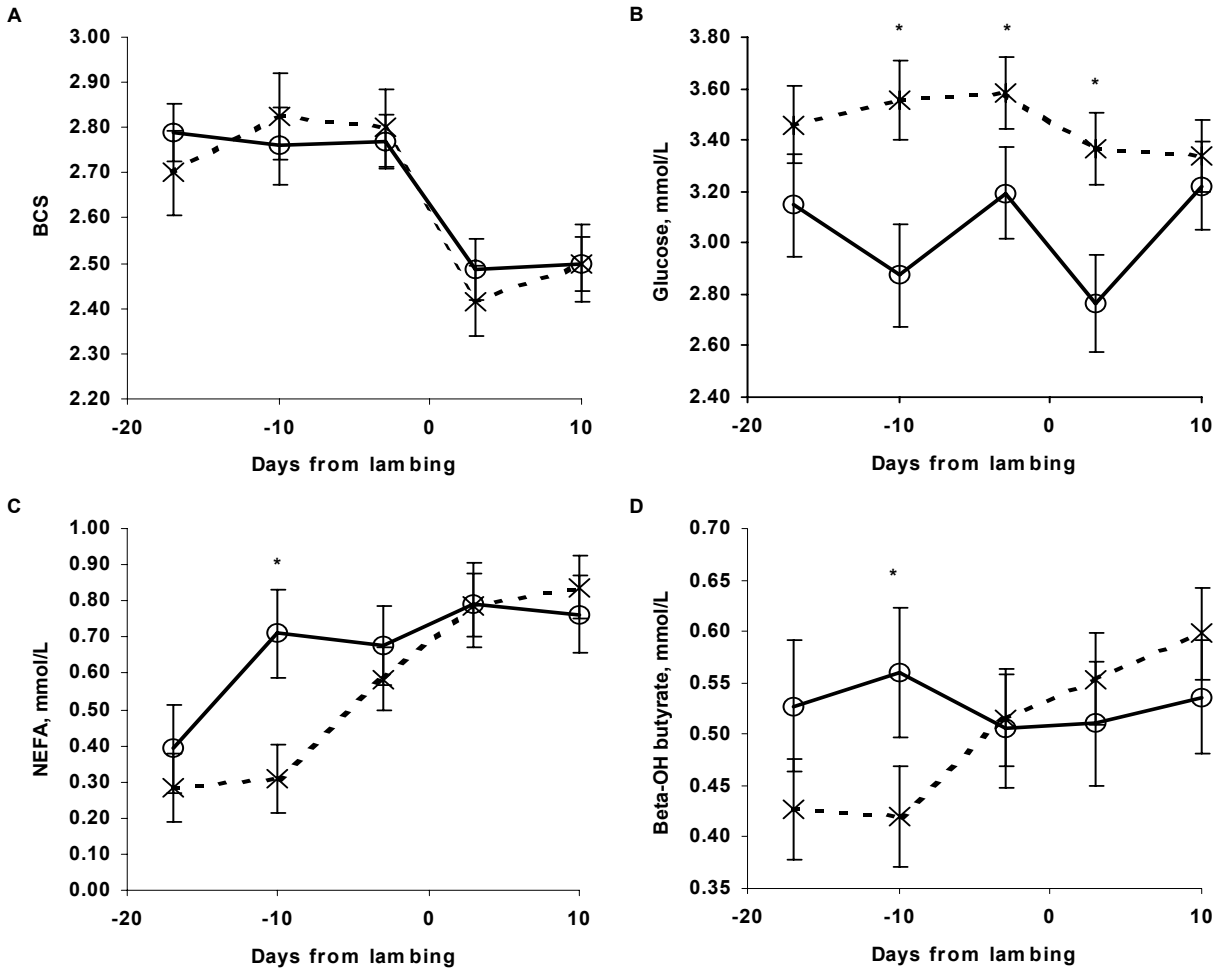

Fig. 1. Changes of body condition score (A), plasma glucose (B), nonesterified fatty acids (C) and beta-OH butyrate (D) concentration in ewes supplemented (- -X- -) or not (--O--) with herbal extract. * P < 0.05.

Cardus marianum and *Taraxacum officinalis* are plants used for treating liver disorders. Their extracts contain antinecrotic and lipotrope substances which can improve the functionality of the hepatocytes. The herb *Echinacea* is used as non-specific immunostimulant and also as anti-inflammatory mediator (Dorsch, 1996).

Changes of energy metabolism indices would indicate better energy status in treated ewes. The higher plasma glucose and the lower pre-lambing NEFA indicate that treated ewes were at lower risk for fatty liver compared with non-treated ewes (Pethick *et al*., 1986; Freetly and Ferrell, 2000). The lower BHBA observed in ewes of the treated group compared with their counterparts would confirm a better energy status and also that treated ewes were at lower risk of pregnancy toxaemia (Bernabucci *et al*., 1998). Better metabolic conditions around lambing can allow to maintain a good liver functionality. This is very important since the alteration of liver functionality can be associated to several peripartum diseases. Lower enzyme activities observed in ewes supplemented with herbal extract further indicate a better liver function in those animals compared with animals of the control group.

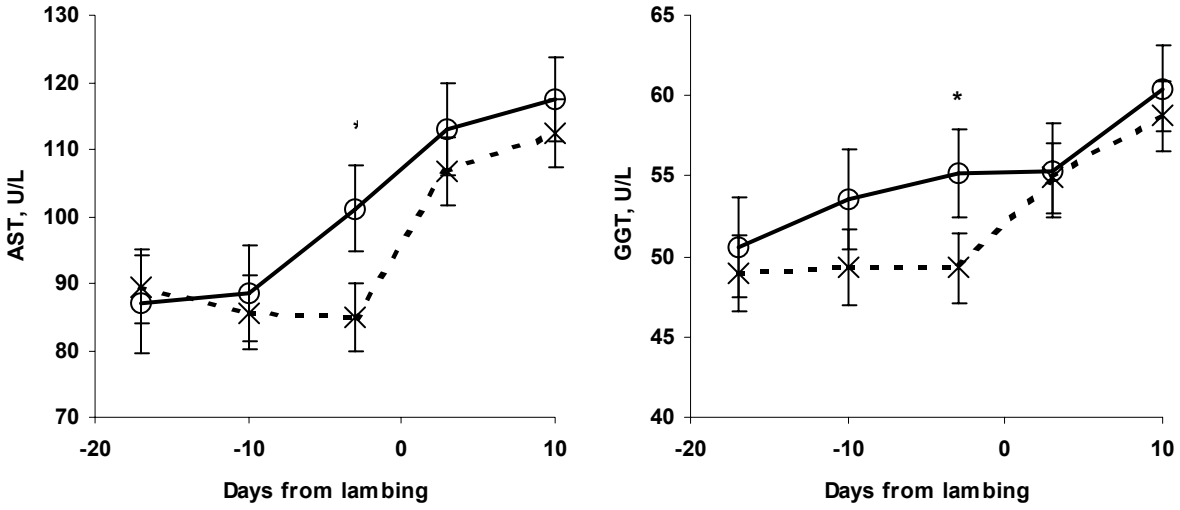

Fig. 2. Changes of plasma aspartatoamino transferase (AST) and gamma-glutamil transferase (GGT) activities in ewes supplemented (- -X- -) or not (--O--) with herbal extract. * P < 0.05.

Conclusions

In the experimental conditions described here, ewes supplemented with 10 g/head/d of a specific formulated herbal extracts showed better energy metabolism status and better liver functionality around parturition. These metabolic conditions can help to reduce the risk of PT in periparturient dairy ewes and increase animal welfare.

Results obtained in the present study add information on the possible beneficial effects of herbal extracts and encourage the utilisation of such products in organic dairy sheep farming.

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