IMPACT: ANIMAL PRODUCTION

Reference 7

Herremans, S; Vanwindekens, F; Decruyenaere, V; Beckers, Y; Froidmont, E 2020 Effect of dietary tannins on milk yield and composition, nitrogen partitioning and nitrogen use efficiency of lactating dairy cows: A meta-analysis JOURNAL OF ANIMAL PHYSIOLOGY AND ANIMAL NUTRITION, 104(5), 1209-1218. 10.1111/jpn.13341

Background and objective

Tannins are secondary plant compounds which have been extensively studied in order to improve the nitrogen use efficiency (NUE) of ruminants. The objectives addressed in this article were: a) to evaluate the effect of dietary tannins on the nitrogen balance and milk production of dairy cows and b) to describe these effects according to tannin dose and tannin type.

Search strategy and selection criteria

Authors collected peer-reviewed scientific publications through a comprehensive literature search. Three databases were used (Scopus, ScienceDirect and Google scholar), and the search was extended to all fields. The searches were conducted in June 2017 and updated in September 2018. The selection of publications went through a two-step process. A first screening of titles and abstracts excluded in vitro and simulation studies, reviews and irrelevant articles. The second step was the analysis of full-text articles in order to select articles meeting several criteria: 1) presence of cows' milk production data; 2) similarity between the control and experimental groups except for the presence of tannin; 3) quantification or possible determination of ingested tannin quantity and 4) only peer-reviewed and non-predatory journal articles (according to the Beall's list, accessed on 10 September 2018).

Data and analysis

Statistical analyses were performed with R software and the "metafor" package. All statistical analyses were performed on the logarithm of the ratios previously calculated (L = ln(R)). The homogeneity of effect sizes was assessed by the Q test and supported the choice of model with or without random effects. As between-study heterogeneity was found, the study was used as a random factor. For each response parameter, two models were compared: missing standard dviation(SD) were replaced by either the mean or the maximum SD of other studies. As models used study variance as a weighting factor, the use of SD max minimised the influence of data with missing SD compared with the use of SD mean. The sensitivity of the results to the model choice was assessed by comparing these two models, based on the Akaike information criteria. For each response parameter individually, the two models were fitted using the "rma" function (linear mixed-effects model) of the "metafor" package, with the restricted maximum likelihood method. Publication bias was assessed with Egger's method.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
47	Dairy cattle	Tannins supplementation	No dietary tannins	Metric: 1) Dry matter intake (DMI); 2) Milk yield; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	75

Results

- Depending on the model, tannins had little or no impact on DMI. Corrected milk yield, milk fat and protein, NUE and fibre digestibility were not influenced by the presence of tannins in the diet.
- According to the best-fitted models, tannins significantly affected milk yield, which was slightly improved by tannins (+1.7%).
- NULL
- NULL
- NULL

Factors influencing effect sizes

- Source of tannins : The source of tannin (naturally contained in feed or extracts added to diet) significantly affected milk yield (p < .01). Feed naturally containing tannins improved milk production compared with tannin extracts added to the diet (+4%).

Conclusion

Tannins had no effect on dry matter intake and milk yield.