EFFECTS OF SILAGE MADE FROM FUNGICIDE-TREATED GRASS ON DAIRY COWS' PERFORMANCE

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The use of pre-ensilage treatment of growing grass with a fungicide in practice improved silage intake and milk performance, as well as the cheese-making ability of the milk.

The aim of the study …

… was to determine the effects of silage made from grass treated with the fungicide (metconazole) on the productivity, milk composition, quality and safety of dairy cows.

Materials and methods

The bale silage used in the trial was prepared from first cut grass harvested from the fourth year of use of the grassland. The grass used to prepare the treatment group silage was treated 27 days before harvest with the fungicide Juventus® 90 (active ingredient metconazole) according to the consumption rate indicated on the product sheet. The grass used to prepare the control group silage was not treated.

The trial was carried out with six multiparous Holstein lactating dairy cows (DIM 99±11.5; BW 674±7.9 kg). Basal values for measurable traits were determined after a 14-day preliminary period. The cows were then paired according to their lactation number, body weight, DIM, milk yield; and then randomly divided between control and treatment groups. Thereafter a cross-over design was conducted with two 3-wk periods. Data collection took place at the end of each period over five (feed intake data) and three (milk data) consecutive days.

Cows were fed twice a day, initially with concentrate (in ration DM 500 g kg^{-1} of which 80% was barley meal and 20% heat-treated cake) and mineral-vitamin feed for one hour and then with silage. The amounts of feed were equally divided between feeding times. Ration metabolisable energy and metabolisable protein content were equal in both trial groups, respectively 11.1 MJ and 95 g in kg ration DM.

The mycotoxins deoxynivalenol (DON) and zearalenone (ZEA) were analysed in silage by the ELISA method (R-Biopharm AG test kits). Metconazole residue detection in silage and milk samples were analysed by liquid chromatography-mass spectrometry (Agilent Technologies, Waldbronn, Germany) using LC-QToF-MS method.

Results

Table. Least square means of DM intake, and milk yield, composition and curdling properties

Items	Control group		Treatment group	SE	*p* value
Diet DM intake, kg d^{-1}	22.0	**+ 1.2**	23.2	0.78	< 0.001
Silage DM intake, kg d^{-1}	10.4	**+ 1.0**	11.4	0.47	< 0.001
Milk yield, kg d^{-1}	34.1	**+ 1.2**	35.3	0.46	0.017
Energy corrected milk yield, kg d^{-1}	31.6	**+ 1.7**	33.3	1.21	0.033
Fat yield, kg d^{-1}	1.13		1.21	0.061	T
Protein yield, kg d^{-1}	1.17	**+ 0.05**	1.22	0.036	0.008
Lactose yield, kg d^{-1}	1.64	**+ 0.05**	1.69	0.036	0.018
Fat, g kg^{-1}	33.5		34.6	1.71	NS
Protein, g kg^{-1}	34.6		34.9	0.38	T
Lactose, g kg^{-1}	47.9		47.7	0.13	NS
Somatic cell count x 1,000 cells mL^{-1}	18.0		15.4	2.73	T
Metconazole, ng mL^{-1}	< LoD		< LoD	-	-
Curd firmness after 30 min, mm	34.3	**+ 2.3**	36.6	0.86	0.025

NS = not significant, T = trend ($p < 0.1$), LoD = limit of detection (5,2 ng ml^{-1})

Metconazole contents in the treated grass were: before harvest, after wilting and in silage respectively 183±0.2 ng g^{-1}, 339±9.2 ng g^{-1} and 657±30.7 ng g^{-1}. In the control grass samples and in silage no metconazole was detected. DON and ZEA contents were below detection limits for both treated and untreated grass samples. Treatment silage contained no DON at the detection limit, while ZEA was found at 118 ppb. Control silage contained DON and ZEA at, respectively, 320 ppb and 213 ppb. The milk was safe, as the metconazole content remained below detection limit and did not exceed the allowed maximum imposed by EU Regulation 777/2013 (0.02 mg kg^{-1} or 20 ng g^{-1}, which was equated to 20 ng ml^{-1}; in this trial the detection limit was 5.2 ng ml^{-1}).

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