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Conference paper

EFFECT OF ADDITIVES ON BIG BALE SILAGE QUALITY AND MILK PRODUCTION

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Introduction

Wilting and big baling is becoming more popular in grass silage making in Finland. Farmers normally use additives on grass when harvested. However, all big bales are not treated with additives, although in many studies additive treatment has improved chemical and microbial quality of big bale silage.

The aim of this experiment was to study the effects of three prewilted big bale silages preserved with no additive, inoculant or formic acid on silage quality and silage intake, on milk yield and milk composition.

Materials and methods

Big bale silages were made from the first-cut timothy-meadow fescue sward after wilting of 8 h. Bales were wrapped with six layers of plastic film using 50% overlapping. Additive treatments were:

- no additive
- inoculant (*Lactobacillus rhamnosus* + *Propionibacterium shermaii*, $5x10^6$ cfu/g)
- acid (80 % formic acid + 2 % orthophoshoric acid, 5 l/t)

Milk production experiment:

- 12 Finnish Ayrshire cows in their 2.-7. lactation
- 4 x (3x3) latin square design with 4 weeks period
- silages were given *ad libitum*
- concentrate 9 kg/d (oats-barley-rapeseed meal-minerals: 405 - 405 -150 - 40 g/kg).

Digestibility of feeds was determined in 3 wethers by total collection and digestibility of total diet in cows by using acid insoluble ash (AIA) as an internal marker.

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Results

– Fermentation quality of all solages was good

– pH and the extent of proteolysis was higher in untreated than in inoculant or formic acid treated silages

– Lactis acid was higher and sugar content and pH lower in inoculant in untreated silage

– Aerobic stability in acid treated silage was better than in untreated or inoculant treated silages.

Table 1. - QUALITY OF BIG BALE SILAGES

Additive	pH	Sugar	Lactic-acid	Acetic-acid	Butyr. acis	Etha-nol	Solub. N	Ammon. N
			g/kgDM				g/kg N	
No	5.74	151	16	7	0.1	11	776	47
Inoculant	0.09	106	72	6	0.1	11	735	31
Acid	4.78	154	7	6	0.0	8	607	27

Graf. 1. - EFFECTS OF ADITIVE ON AEROBIC STABILITY OF BIG BALE SILAGE

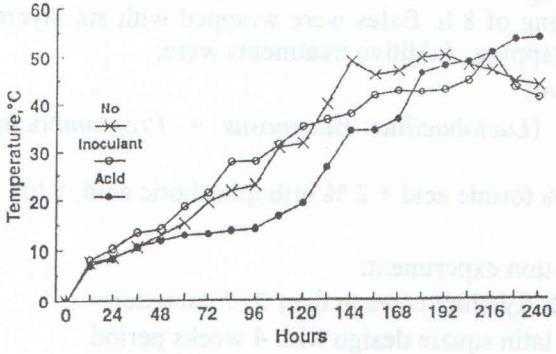

Table 2. - CHEMICAL COMPOSITION OF FEEDS

Feed	Dry matter	Crude prot.	Crude fibre	NDF	AAT	PBV	Me/MJ	D-value
	g/kg			g/k/DM			kg DM	%
Silage								
Untreat.	374	159	263	508	86	12	0.97	71
Inocul.	384	158	254	496	87	10	0.98	71
Acid	372	158	261	517	87	9	0.98	71
Concentr.	890	173	83	267	107	1	1.05	75

Feedvalues are calculated according to digestibility measured by sheep

– Digestibility of total diet was beterr in cows given inoculant treated silage than in cows given acid or untreated silage.

There was no difference in digestibility of silages in wethers.

Table 3. - DIGESTIBILITY OF TOTAL DIET IN COWS

	Digestibility -%				
Additive	Org. matter	Crude prot.	Crude fibre	NDF	N-free extract
No	74.8	73.0	67.4	64.6	77.4
Inoculant	76.7	75.3	67.5	67.2	80.1
Acid	73.1	71.3	63.9	63.1	77.0
SEM	0.39	0.47	0.71	0.56	0.30
Statistical significance					
No vs. Additive				*	
Inoculant vs. Acid	***	***	**	**	***

– Intake of acid treated silage was 3% higher than that of untreated or inoculant silages

– Milk and protein yield and protein concentration were higher, curd firmness ($A1_{10}$) and sensory quality of milk (smell and taste) were better in milk produced by cows given silages treated with additives compared with untreated silage

– Inoculant and acid treated silages produced same protein yield

– Milk urea was lower in cows fed with formic acid than with inoculant or untreated silages.

Table 4. - EFFECTS OF ADDITIVES IN BIG BALING ON INTAKE AND MILK PRODUCTION

Additive	Silage	Conc.	Milk	ECM	Fat	Protein	Lactose
	kg DM/d		kg/d		g/d		
No	15.3	7.8	31.6	34.3	1501	1028	1497
Inocul.	15.3	7.7	32.4	34.9	1515	1062	1529
Acid	15.8	7.8	32.1	34.7	1514	1058	1502
SEM	0.10	0.05	0.21	0.30	19	8	12
Statistical significance							
No vs. Additive	*		*			**	
Inocul. vs. Acid	**						

Table 5. - MILK COMPOSITION AND QUALITY

Additive	Fat g/kg	Prot. g/kg	Lact. g/kg	Urea mg/100ml	Casein N g/kg N	Curd firmness A_{10}	Taste & smell
No	47.6	32.7	47.4	27.4	757	28.7	3.77
Inocul.	47.1	33.0	47.3	28.5	756	31.1	4.00
Acis	47.5	33.2	46.9	24.7	759	20.4	3.97
SEM	0.54	0.12	0.16	0.30	1.8	0.59	0.06
Statistical significance							
No vs. Additive		*		*		*	**
Inocul. vs. Acid				***			

Conclusion

Silage additives are recommanded for wilted big bale silage to improve milk and protein yield, milk quality and economy of milk production.

DJELOVANJE ADITIVA NA KVALITETU SILAŽE U VELIKIM BALAMA I PROIZVODNJI MLIJEKA

Sažetak

Ostavljanje trave da uvene i spremanje u velike bale postaju sve popularniji u proizvodnji silaže u Finskoj. Farmeri obično stavljaju aditive na travu kod košnje. Međutim, sve se velike bale ne tretiraju aditivima, iako je tretiranje aditivima prema mnogim istraživanjima poboljšalo kemijsku i mikrobsku kvalitetu silaže u velikim balama.

Cilj je ovog pokusa bio proučiti djelovanje (učinak) tri prethodno uvenule silaže u velikim balama, konzervirane bez aditiva, cjepiva ili mravlje kiseline, na kvalitetu i konzumiranje silaže, te na količinu i sastav mlijeka.

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