

560 Effect of starch level and straw intake on animal performance, rumen wall characteristics and liver abscesses in intensively fed Friesian bulls



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1 Introduction

The average level of liver abscesses among Danish young bulls is 11%. In relation to productivity and not least animal welfare the focus on how to reduce the level has increased in recent years. In 2003 the main Danish abattoirs introduced an economical penalty to each bull having liver abscesses.

Traditionally beef production in Denmark is carried out by feeding high amount of concentrates and low amount of roughage to dairy bull calves. Liver abscesses are mainly considered related to rumen acidosis and rumen parakeratosis, which is normally seen under such feeding regimes. In Denmark, antibiotics are not allowed as a preventive treatment against liver abscesses. Therefore it is important to find other ways to reduce the occurrence of rumen acidosis and the frequency of liver abscesses.

2 Objectives

To investigate the effects of a reduced starch content and an increased straw intake on

- Performance
- Feed intake
- Damages to the rumen wall
- Liver abscesses

in intensively fattened young HF bulls

3 Material and Methods

Two repeated trials were conducted with 2x48 Danish Holstein Friesian bulls (146 ± 24 kg LW) allocated to four treatment groups in a 2x2 factorial design.

The bulls were fed either a high starch (**high**) or a low starch (**low**) concentrate. In the **low** concentrate 25 % of the wheat in the **high** concentrate was replaced by dried sugar beet pulp (20 %) and high quality grasspellets (8%). The starch level was 39.1 and 24.3% (wt) and the energy content was 104.4 and 99.3 Scandinavian Feed Unit (SFU)/100 kg feed for the **high** and **low** starch concentrate, respectively.

For each type of concentrate the bulls were fed either chopped barley straw (**S**) or chopped barley straw containing 25% (wt) sugar beet molasses (**Sm**) as roughage. Feeds were available ad libitum and individual feed intake was recorded automatically by Insentec® Feed System.

The bulls were slaughtered at 11.3 months of age weighing 440 ± 39 kg LW. At slaughter the rumen wall and liver were examined and a macroscopic evaluation was carried out. Statistical analysis of variance was performed by using the GLM procedure of SAS.

Table 1: Feed intake, energy intake, daily gain, feed conversion rate and percentage of liver abscesses

Concentrate (CONC)	Feed rations				p ⁵⁾	
	High starch		Low starch			
Roughage (ROUG)	S	Sm	S	Sm	CONC	ROUG
# animals	20	22	21	22		
CONC intake, kg per day	6.48 ^a	6.44 ^a	7.07 ^b	6.67 ^a	**	0.10
ROUG intake, kg per day ¹⁾	0.51 ^a	1.15 ^b	0.60 ^a	1.23 ^b	*	***
Straw intake, kg per day ²⁾	0.51 ^a	0.87 ^b	0.60 ^a	0.92 ^b	**	***
NEI ³⁾ per day	6.86	7.11	7.14	7.03	0.53	0.60
ADG, g per day	1399	1430	1390	1351	0.13	0.87
FCR ⁴⁾	4.94 ^a	4.99 ^a	5.14 ^a	5.23 ^b	**	0.33
Liver abscess, %	20.0	22.7	9.5	0	*	0.65

¹⁾ roughage inclusive molasses ²⁾ roughage exclusive molasses ³⁾ NEI= Net Energy Intake (Scandinavian Feed Unit) ⁴⁾ FCR= Feed Conversion Rate (SFU/kg gain) ⁵⁾ *P<0.05 **P<0.01 *** P<0.00,01 Different characters indicates a difference at p<0.01



Figure 1: Hyperemic area of the rumen wall of a bull fed concentrate and straw

4 Results and Discussion

Feed intake was significantly higher with the **low** than the **high** starch concentrate. However, due to a lower energy content the daily energy intake was not different. Mixing molasses in the straw increased straw intake by 60 percentage. Straw intake was also affected by the concentrate type with a higher straw intake when feeding the **low** starch concentrate (Table 1). Total daily net energy intake (NEI) and average daily gain (ADG) were not different between the treatment groups. However the bulls fed a **low** starch concentrate had a lower feed conversion rate (FCR).

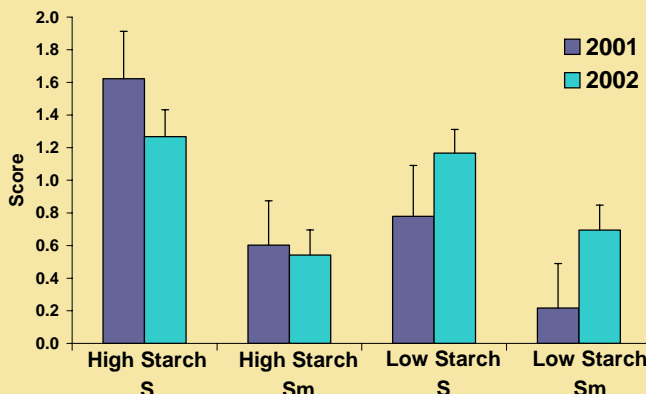


Figure 2: Average ruminal wall score. A higher score corresponds to more damage to the rumen wall

Bulls fed the **low** starch concentrate had a lower frequency of liver abscesses. This effect was mainly found the first year (2001). The **low** starch concentrate improved the rumen wall condition the first year, but had no effect the second year. The higher straw intake did not affect the frequency of liver abscesses even though it reduced rumen wall damages both years (Figure 1). These relations may be influenced by the fact that the macroscopic rumen wall evaluation is carried out at slaughter whereas the liver abscesses may have established at an earlier stage in the bull's life.

5 Conclusion

The low starch concentrate

- did not depress growth rate
- resulted in a higher concentrate intake and lower feed conversion rate
- reduced liver abscesses and rumen wall damage

The higher straw intake

- did not depress performance
- reduced the rumen wall damage
- did not reduce liver abscesses