EAAP Barcelona
S36 paper 4102
August 24th – 27th 2009

Three wheat treatments for dairy cattle: rolled wheat, ensiled ground wheat and ensiled whole wheat in brewers' grains

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Situation

- Previous research (De Campeneere et al., LS 2006)
  - Very good results with 4.6 kg upto 6.1 kg DM of NaOH treated wheat in a MS/PGS diet without indications of acidosis
  - However, laborious and unpleasant technique
  - Further search for easier technique with comparable results (and possibly lower cost)

Materials and methods

- **Treatments**:
  - rolled wheat (control treatment)
    - cost of rolling;
    - for a relatively short period
  - ensiled ground wheat
    - cost of grinding + ensiling
    + ensiled => long conservation
  - ensiled whole wheat in brewers' grains
    + only mixing, no additional cost
    + ensiled => long conservation

Materials and methods

- LS design 3 x 3 (1 period = 4 weeks, last 2 weeks collection of milk samples (4/week))
- 18 Holstein cows, 104 DIM, 35 liters milk at start
- roughage diet: 55%/45% maize silage / prew. grass silage fed ad lib + 11.8 kg brewers' grains
- 1 out of 3 wheat varieties: 3 kg
- supplemented with soybean meal and concentr according to individual requirements

Materials and methods

- all diets formulated : similar energy (NEL) and protein supply (CP, DPI, RDPB)
- Concentrate: -0.3 and -0.15 kg weekly for multi- and primiparous cows (lactation stage)
- In some cases, too few concentrate to be replaced => part of the wheat was fed as surplus

Results: feed evaluation

	RW	EW	BGW	MS	PGS	BG
(/ kg DM)	850	860	370	300	430	270
CP (g)	122	122	226	93	222	296
EE (g)	15	16	60	39	43	86
CF (g)	26	29	110	200	218	163
Ash (g)	19	22	36	47	118	44
NDF (g)	140	135	344	395	390	532
starch (g)	664	628	299	281	-	49
NEL (MJ)	8.46	8.40	7.05	6.37	6.58	6.29
DPI (g)	119	113	152	56	68	193

Results: feed evaluation

	RW	EW	BGW
DM (g)	850	860	370
starch (g/kg DM)	664	628	299
% bypass starch	10	9	56
CP (g/kg DM)	122	122	226
% bypass protein	34	19	64
FOM (g/kg DM)	777	837	365
NEL (MJ/kg DM)	8.46	8.40	7.05
DPI (g/kg DM)	119	113	152

Results: dietary composition

(g/ kg DM)	RW	EW	BGW
CP	171	172	173
EE	46	46	48
CF	165	163	169
Ash	68	69	70
NDF	371	369	370
starch	204	200	191
NEL	6.9	6.9	6.8
DPI	96	96	93
RDPB	13	14	23

Results: DM intake

	RW	EW	BGW	P-value
(kg DM/day)				
MS	**5.9^{b}**	**5.5^{c}**	**6.3^{a}**	**<0.001**
PGS	**5.4^{b}**	**5.1^{b}**	**5.7^{a}**	**0.002**
BG	**3.0**	**3.0**	**5.5**	**-**
Wheat	**2.6**	**2.7**		**-**
Concentrate	**3.3**	**3.4**	**3.4**	**0.432**
Total	**20.3^{ab}**	**19.8^{b}**	**20.9^{a}**	**0.019**

Results: nutrient intake

	RW	EW	BGW	P-value
Daily intake				
NEL (MJ/d)	139.7^{ab}	137.0^{a}	142.4^{b}	0.097
NEL (% requir)	99.9^{a}	100.3^{a}	96.0^{b}	0.057
DPI (kg/d)	1.95	1.92	1.94	0.529
DPI (% of requir)	99.7	101.9	102.0	0.579
RDPB	263^{a}	260^{a}	474^{b}	<0.001

Results : performance

	RW	EW	BGW	P-value
Milk (kg)	35.8 [a]	34.6 [b]	34.8 [ab]	0.068
Fat (g/kg)	33.4 [a]	33.2 [a]	40.8 [b]	<0.001
Protein (g/kg)	32.3	32.2	32.0	0.518
FPCM (kg)	32.3 [a]	31.3 [a]	34.6 [b]	<0.001
MUC	255 [a]	244 [a]	281 [b]	0.001
Faecal starch (g/kg DM)	26	21	115	-

Discussion

- Influence of wheat treatment on the feeding value
  - %undCP and %undstarch

- Indications of lack of physical structure (SARA) for treatments RW and EW :
  - reduced DM intake and milk fat content

- Starch content in the faeces of the animals fed the BGW was higher (115 g versus 26 and 21 g/kg DM faeces) than for RW and EW, respectively.

Conclusion

BGW is less offensive for rumen acidosis, has more undegradable starch, but under the conditions of this trial it had a too low starch digestion to be promoted as such.

Possible solutions:

- Ensiling immediately at delivery of the BG (using the warmth of BG)
- Ensiling in BG with lower DM content (in this trial: pressed BG (27%DM))