No influence of coarseness of grain and level of rumen by-pass starch of pelleted concentrates on performance, carcass quality, and rumen wall characteristics of rosé veal calves

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Session 34, Poster 16

Objective

The present experiment focuses on rosé veal calf production based on Danish Holstein bull calves.

The overall objective was to improve rumen environment and reduce the high incidence (16%) of liver abscesses in this production.

Two alternative types of pelleted concentrates were tested and compared with a traditional (N) pelleted concentrates based on finely ground ingredients.

The alternative concentrates were:

1) **Coarse (R)** with the same cereal composition as N but with coarsely ground cereals
2) **By-pass starch (S)** where half of the barley and wheat grain was substituted with finely ground sorghum and corn.

The study recorded individual feed intake, growth performance, carcass quality and rumen wall characteristics at slaughter.

Insentec automated feeders used to record individual feed intake

Housing conditions – strawbedded pens

Materials and Methods

- Bull calves were purchased at 23 d of age, weaned at 56 d of age and concentrate-recordings started at 83 d of age.
- A total of 57 Holstein bull calves (n= 19/treatment) housed in 2 x 3 straw-bedded pens were used.
- Bull calves were offered one of the three concentrates *ad libitum* from weaning (2 months) to slaughter (< 10 months).
  - **N: Normal concentrate**
  - **R: Coarse concentrate**
  - **S: By-pass concentrate**
- **N-concentrate**: A pelleted concentrates based on finely ground wheat and barley as starch sources.
- **R-concentrate**: The cereal ingredients (barley and wheat) were the same as in N-concentrate but were coarsely ground resulting in a mean particle size of 1.5 mm compared with 0.6 mm in N before pelleting.
- **S-concentrate**: Half the barley and wheat was replaced by finely ground sorghum and corn, which increased the theoretical by-pass starch to 68 g/kg compared with 25 g/kg in N and R.
- All three concentrates had the same total starch (345 g/kg), NDF (170 g/kg) and crude protein (15%) content and a pellet diameter of 4 mm.
- Concentrate intake was registered individually using Insentec feeders.
- Barley straw was available *ad libitum* but was not registered.
- Rumen papillae length and shape, aggregation/clumping, redness/hyperemia, and necrosis were evaluated in atrium and ventral rumen sac at slaughter.

Conclusions

Performance and carcass quality:

- it was possible to obtain the same high level of production performance with all three types of concentrates
- Carcass quality was similar across treatments

Rumen papillae and rumen wall condition:

- Rumen papillae length and shape was not affected
- Neither more coarse ingredients nor more by-pass starch in a pelleted concentrate could improve rumen wall condition

Live weight, growth rate and feed conversion

Concentrate type	N	R	S	*P*
No. calves, n=57	19	19	19	-
LW at 23 d, kg	56,7	58,5	59,5	ns
ADG 23-83 d, g/d	994	939	918	ns
LW at 83 d, kg	117	114	114	ns
ADG 83 d - slaughter, g/d	1437	1412	1440	ns
FCE, Scand Feed U/kg ADG	4,28	4,14	4,20	ns
LW at slaughter. kg	386	386	385	ns
ADG, 23 d – slaughter, g/d	1336	1300	1316	ns
Age at slaughter, d	270	274	271	ns

Carcass, premiums and liver abscesses

Carcass weight, kg	191,8	195,8	193,0	.20
Dressing percentage	51,2^{a}	52,5^{b}	51,8^{ab}	.01
EUROP conformation	3,9	4,0	3,7	ns
EUROP fatness	2,3	2,3	2,3	ns
Lean/tallow colour	2,9	2,9	2,9	ns
Carcass premiums, n	14	16	15	ns
Liver abscesses, n	3	5	1	-

Rumen papillae and rumen wall condition

Concentrate type	N	R	S	*P*
Length in Atrium, ventrally, mm	13,5	14,1	13,3	ns
Length in rumen, ventrally, mm	4,8	5,2	6,1	ns
Aggregation in Atrium #	1,1	1,0	0,7	ns
Aggregation in rumen #	1,3	1,5	0,9	.20
Redness in Atrium #	1,3	1,4	0,9	ns
Redness in rumen #	1,4^{a}	1,1^{a}	0,4^{b}	.05
Necrosis in Atrium #	0,2	0,5	0	.20
Necrosis in rumen #	1,5	1,3	0,7	ns

Scale 0-4; 0=no aggregation/no redness/no necrosis, 1, 2, 3, 4=extensive aggregation/ extensive redness/extensive necrosis

Results

- Daily gain (1430 g/d), feed conversion (4.2 kg concentrate/kg gain), LW at slaughter (386 kg), carcass weight (194 kg), and EUROP conformation (3.9) were not affected by type of concentrate (P>0.05).
- Rumen papillae length and shape in atrium and ventral rumen sac was not affected by concentrate (P>0.05).
- Rumen wall condition showed degrees of clumping, hyperemia and necrotic areas in all three treatment groups, but with no general differences between type of concentrate (P>0.05). Only for hyperemia in the ventral sac, S was slightly better than N (P<0.05).

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