



EAAP 2009
60th Annual Meeting of the European Federation
of Animal Science
Fira de Barcelona, Barcelona, Spain, August 24-27, 2009

Session 36; Abstract n. 4481

**EFFECTS OF LOW PROTEIN DIETS AND RUMEN
PROTECTED CLA ON GROWTH PERFORMANCE
OF DOUBLE-MUSCLED PIEMONTESE BULLS**

M. Dal Maso, S. Schiavon, F. Tagliapietra, G. Bittante
matteo.dalmaso@unipd.it



Department of
Animal Science
University of Padova

AIM

To evaluate in double muscled Piemontese bulls (DMB) the effects of rations with conventional or low CP content with or without CLA addition on:

1. *Infra vitam* performance

2. Carcass traits

Materials and Methods ^{1/4}

- **Length of trial:**

February 2008 to January 2009 (332 days)

- **Animals:**

48 Piemontese double muscled bulls divided in 4 treatment groups (divided in 3 sub groups homogeneous for LW)

- **Housing:** Open front barn in 12 slatted floor pens

- **Initial average live weight:** 279 ± 24 kg

Materials and Methods ^{2/4}

Treatments:

2 dietary protein levels with or without inclusion of rumen protected CLA (group without inclusion of CLA in the diet received Hydrogenated Soybean Oil – HSO):

- High CP content and HSO → **HP_{HSO}**
- High CP content and CLA → **HP_{CLA}**
- Low CP content and HSO → **LP_{HSO}**
- Low CP content and CLA → **LP_{CLA}**

Composition of rations (% DM)

	Adaptation diet	Experimental diets			
		HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}
Ingredients:					
Meadow hay	37.0	-	-	-	-
Corn silage	24.0	25.0	25.0	27.7	27.7
Corn meal	16.0	36.0	36.0	40.0	40.0
Sugar beet pulp dried	6.0	10.2	10.2	11.3	11.3
Wheat bran	6.0	6.3	6.3	7.0	7.0
Soybean meal	6.0	12.6	12.6	3.3	3.3
Wheat straw	3.0	6.0	6.0	6.6	6.6
Vit. min. mix	2.0	2.4	2.4	2.6	2.6
Calcium soap	-	0.8	0.8	0.9	0.9
Top dressed (g/head/d):					
Hydrogenated soybean oil (HSO)	-	65		65	
Rumen protected CLA (RPCLA)			80		80

Material and Methods ^{3/4}

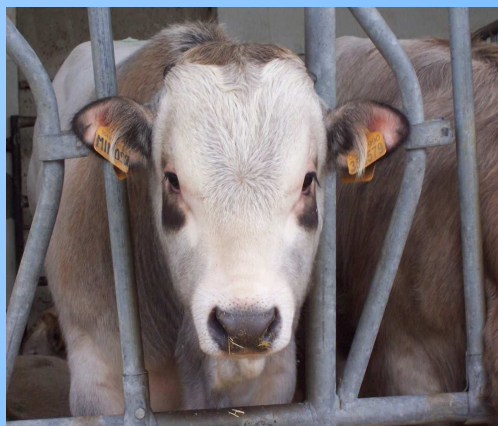
Experimental records

Weekly:

- DM intake

Monthly:

- live weight
- *in vivo* SEUROP
 - fleshiness
 - fatness score



Material and Methods ^{4/4}

- Average Daily Gain (ADG)
- Feed Conversion Ratio (FCR)
- Cold dressing at slaughter
- N excretion following a mass balance approach (ERM, 2001)



Statistical analysis

Individual data were submitted to ANOVA:

$$y_{ijk} = \mu + C_i + T_j + C_i \times T_j + e_{ijk}$$

Pen data were submitted to ANOVA:

$$y_{ijk} = \mu + C_i + T_j + e_{ijk}$$

C= effect of sub-group of LW (light, medium, heavy)

T= effect of feed treatment

Orthogonal contrasts were run to evaluate the effects due to **Crude Protein level (CP)**, **Additive (A)** and the interaction **Crude protein x Additive (CP x A)**



Chemical composition of rations (%DM)

		Adaptation diet	Experimental diets			
			HP _{H₂O}	HP _{CLA}	LP _{H₂O}	LP _{CLA}
Crude Protein (CP)	% DM	12.5	14.7	14.7	11.0	11.0
Net Energy (NE)	MJ/kg DM	-	7.8	7.8	7.8	7.8
Lipids	% DM	2.5	4.1	4.1	4.3	4.3
NDF	"	43.9	28.0	28.0	29.7	29.7
Starch	"	21.6	35.7	35.7	39.5	39.5

Evolution of Live Weight (kg LW)

Periods	Treatment				RMSE	P		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
Initial, 0 d	281	280	276	277	15			
After 120 d	470	453	432	437	23	***		
After 233 d	594	577	569	576	42			
Final, 332 d	686	655	659	672	52			

Average Daily Gain (kg/d)

Periods	Treatment				RMSE	P		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
Initial, 0-120 d	1.602	1.454	1.284	1.234	0.187	***		
Central, 120-233 d	1.111	1.105	1.194	1.218	0.310			
Final, 233-332 d	0.910	0.773	0.881	0.946	0.265			
Total, 0-332 d	1.228	1.129	1.132	1.174	0.151			

Dry matter intake (kg/d)

Periods	Treatment				RMSE	<i>P</i>		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
Initial, 0-120 d	8.16	7.99	8.09	7.87	0.21			
Central , 120-233 d	8.21	8.16	8.66	8.30	0.31			
Final, 233- 332 d	10.29	10.00	10.26	10.31	0.50			
Total, 0-332 d	8.82	8.66	8.94	8.76	0.27			

Feed Conversion Ratio (kg/kg)

Periods	Treatment				RMSE	<i>P</i>		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
Initial, 0-120 d	5.09	5.50	6.32	5.97	0.25	**		*
Central , 120-233 d	7.39	7.46	7.32	6.82	0.78			
Final, 233- 332 d	11.40	13.16	11.81	11.00	1.55			
Total, 0-332 d	7.18	7.68	7.90	7.47	0.29			*

Carcass traits

	Treatment				RMSE	P		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
Cold carcass weight, kg	468	444	438	450	38	n.s.	n.s.	n.s.
Cold dressing %	67.7	67.6	66.8	67.2	1.29	n.s.	n.s.	n.s.
Fleshiness ¹	5.17	5.30	5.27	5.11	0.58	n.s.	n.s.	n.s.
Fatness ²	1.93	1.86	1.86	1.83	0.17	n.s.	n.s.	n.s.
n.s.: not significant; ¹ Fleshiness: S=6, E=5...P=1; ² Fatness: 1= very lean...5=very fat								

N excretion

	Treatment				RMSE	P		
	HP _{HSO}	HP _{CLA}	LP _{HSO}	LP _{CLA}		Protein level (CP)	Additive (A)	CPxA
N balance, kg/place/year								
N consumed	72.4	71.1	54.8	53.7	1.7	***		
N retained	12.3	11.3	11.3	11.8	0.6			
N excreted	60.1	59.7	43.5	41.9	1.4	***		
N in manure ¹	42.1	41.8	30.4	29.4	1.0	***		

*** P < 0.001; ¹Assuming that 28% of N was lost in atmosphere

Conclusions

- The reduction of the dietary CP from 14.6 to 11%:
 - * did not influence production and carcass traits over the whole trial
 - * reduced N excretion from 60 to 43 kg/bull place/year (-28%)
- The addition of CLA:
 - * Significantly enhanced FCR but on low CP ration only
- IMPLICATIONS:
 - * Low CP diets can be used with success on DMB. In areas where maximum N loads are permitted a lower N excretion offers the opportunity to increase markedly the LW production per hectare

Acknowledgements

PADOVA PROVINCE

ANABORAPI – National Ass. of Piemontese Bulls Farmers

COMPRAL cooperative

SILA s.r.l.

