

## **Influence of restricted/unrestricted feeding on the production performance of growing Brown cattle**

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### **Abstract**

*The experiment used 32 growing Maramures Brown cattle assigned to two groups of 16 animals each; each group had two subgroups according to body weight: C1 with average initial weight 141 kg, C2, 215 kg, E1, 150 kg and E2 214 kg respectively. The control groups were fed at discretion throughout the experimental period, while the experimental groups received about 70% of the diets given to the control groups during the first stage of the experiment (41 days); during the second stage (also 41 days), the experimental groups received feed at discretion. Since the restriction only concerned the energy to protein ratio, the compound feed for the experimental groups had higher amounts of vitamins and minerals. Both the concentrate feed and the bulk forages were adjusted weekly for the experimental groups.*

*Total feed intake during the first experimental stage (kg DM/animal/day) was 4.71 in C1, 5.86 in C2, 3.41 in E1 and 4.13 in E2. During the second stage, the intakes were 5.50 in C1, 6.96 in C2, 5.65 in E1 and 6.93 in E2.*

*Average weight gain (g/animal/day) during the first stage was 1097 in C1, 1243 in C2, 878 in E1 and 976 in E2, while the values for the second stage were 1170 in C1, 1293 in C2, 1219 in E1 and 1317 in E2. No significant difference was observed, however, throughout the overall experimental period between the control and experimental groups, while feed conversion ratio was better in the experimental groups.*

**Keywords:** *cattle, feeding, restricted, concentrate, silage*

### **Introduction**

Alternative feeding, free access or restricted, on a given time interval or throughout the entire period of exploitation, may bring changes in the overall (and single ingredient) feed intake, in weight gain and weight gain composition and in the efficiency of feeding fattening steers.

For a give type of diets, the ingested amounts vary according to numerous factors among which the genotype, age, body weight and feeding level.

The latter factor is the most important factor affecting animal

production including the amount of meat produced by the fattening steers.

Different opinions exist on the ratio between the amount of ingested feed in a given period and the efficiency of feeding fattening steers. Some say that increasing feed intake towards *ad libitum* improves feed efficiency ratio. Inversely, other say that temporary restricted feeding followed by free access to food improves feed efficiency ratio (Sainz *et al.* 1995; Steen, 1995). This would be the result of what is known as “compensatory gain” (increasing the weight gain after feeding restriction beyond the possibility offered by the food) (Ryan, 1993; Picard, 1995, Drennan, 1979).

The purpose of this experiment was to quantify in fed intake, weight gain and feed efficiency ratio the effects of temporary feeding restriction on fattening Brown steers.

### **Material and method**

The experiment used Brown fattening steers during July-October 2000.

The animals were assigned randomly to two groups, each with two subgroups, differing in weight gain: control 1 (small animals), control 2 (large animals), experimental 1 (small animals) and experimental 2 (large animals).

The control groups had free access to food throughout the experimental period, while the experimental groups received about 70% of the food intake of the control groups during the first stage of the experiment (41 days) and had free access to food during the second stage (also 41 days).

Both the compound feeds and the bulk feeds (except for the corn silage with 33% DM) were adjusted weekly in quantity for the experimental groups. The two components of the diet were given separately.

The restriction concerned only the energy and protein, which is why the compound feed for the experimental groups had higher levels of vitamin-mineral premix (between 1 and 1.4%).

The GRUBBS test was used to assess the differences in the initial weight gain and ANOVA test was used to reveal the significance of weight gain differences.

### **Results and discussion**

#### *Chemical composition and nutrient value*

The chemical composition (CP, EE, CF, Ca and P) was determined by analysis, while the nutritive value (meat FU, IDPN, IDPE) was

determined by calculations based on the chemical composition as shown in Table 1.

**Table 1** Feed chemical composition and nutritive value (by kg DM)

	CF control groups	CF experimental groups	Corn silage
CP, g	187	184	82
EE, g	28	27	22
CF, g	91	89	205
Ca, g	9.6	12.0	3.4
P, g	5.9	7.0	2.4
meat FU	1.11	1.10	0.91
IDPN	139	137	52
IDPE	116	114	65

#### Feed intake

Table 2 gives the average feed intake (overall and by ingredient) and the ratio of silage and compound feed.

During the first stage of the experiment, the two control groups with free access to food consumed daily 2.13 and 2.92 kg DM corn silage and 2.58 and 2.94 kg DM compound feed.

During the second stage, when all groups had free access to food, the intakes were similar. However, higher corn silage intake was observed in the experimental groups: 2.92 kg DM/day in E1 compared to 2.80 kg DM/day in C1 and 3.93 kg DM/day in E2 compared to 3.81 kg DM/day in C2.

**Table 2** Average feed intake (kg DM/day)

	C1	C2	E1	E2
First period				
Corn silage	2.13	2.92	1.51	1.98
Compound feed	2.58	2.94	1.90	2.15
Overall intake	4.71	5.86	3.41	4.13
Silage/CF	45/55	50/50	44/56	48/52
Second stage				
Corn silage	2.80	3.81	2.92	3.93
Compound feed	2.70	3.15	2.75	3.00
Overall intake	5.50	6.96	5.65	6.93
Silage/CF	51/49	55/45	51/49	57/43

#### Weight gain

Average weight gain and body weight are shown in Table 3.

Comparing weight gains gives the following observations:

- during the first experimental stage, E1 (878 g/day) achieved 104.2% of C1 gain (1170 g/day), while E2 (1317 g/day) achieved

101.9% of C2 (1293 g/day) gain. The experimental groups achieved a compensatory weight gain, but the values were rather low.

- overall, E1 achieved 92.5% of C1 group weight gain (significant differences for  $P < 0,5$ ;  $P = 0,083$ ), while E2 achieved 91.8% of C2 weight gain (significant differences for  $P < 0,05$ ;  $P = 0,022$ ).

**Table 3** *Body weight (kg) and weight gain (g/day)*

	C1	C2	E1	E2
Initial weight	141	215	150	214
Intermediary weight	186	266	186	254
Final weight	234	319	236	308
Gain first period	1097(90)*	1243(87)	878(76)	976(70)
Gain second period	1170(108)	1293(97)	1219(99)	1317(98)
Overall gain	1133(73)	1268(81)	1048(52)	1146(75)

\*) standard deviation

#### *Dietary energy and protein supply*

Table 4 shows the dietary energy and protein supply calculated from the chemical composition of the ingredients and from the feed intake.

**Table 4** *Average daily energy and protein supply*

	C1	C2	E1	E2
First stage				
meat FU	4.80	5.92	3.47	4.17
IDPN, g	469	557	339	392
IDPE, g	440	532	317	374
Second stage				
meat FU	5.55	6.96	5.68	6.88
IDPN, g	518	635	530	628
IDPE, g	497	615	509	607

During the first stage the average energy and protein intake was 72% in E1 compared to C1 and 70% in E2 compared to C2.

During the second stage the average energy and protein intake was 102% in E1 compared to C1 and 99% in E2 compared to C2, the differences being very low.

#### *Efficiency of energy and protein utilisation*

The efficiency of energy (meat FU/kg gain) and protein (IDPN and IDPE) utilisation are shown in Table 5.

**Table 5** Efficiency of energy and protein utilisation

	C1	C2	E1	E2
First stage				
meat FU	4,38	4,76	3,96	4,27
IDPN, g	427	448	386	401
IDPE, g	401	428	361	383
Second stage				
meat FU	4,74	5,38	4,66	5,22
IDPN, g	443	491	435	477
IDPE, g	425	476	417	461
Overall experiment				
meat FU	4,56	5,07	4,31	4,75
IDPN, g	435	469	410	439
IDPE, g	413	452	389	422

Thus, E1 used 4.31 meat FU, 410 g IDPN and 389 g IDPE to retain one kg of gain, compared to 4.56 meat FU, 435 g IDPN and 413 g IDPE used by C1.

E2 used 4.75 meat FU, 439 g IDPN and 422 g IDPE to retain one kg of gain, compared to 5.07 meat FU, 469 g IDPN and 452 g IDPE used by C2.

The better utilization of nutrients is in agreement with the results of Fox, 1972; Dijkstra, 1988 and Patterson, 1995.

## Conclusions

1. Under the proposed experimental conditions, of feed restriction (about 70% of *ad libitum*) during the first stage of fattening followed by free access to food during the second stage of fattening, the growing cattle used better, overall, the dietary energy and protein, by about 6% compared to the situation in which animals had free access to food throughout the experimental period.
2. Although weight gain was lower during the feed restriction, the efficiency of feed utilization was better, so it is farmer's choice to select one of the two possibilities.

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