UDK 636.2.033;636.23.234.1 Izlaganje sa znanstvenog skupa
Conference paper

FATTENING PARAMETERS AND CARCASS VALUE OF BABY-BEEF HOLSTEIN BULLS TO 330 - 430 KG LIVE WEIGHT

J. Soutor, G. Chládek I. Ingr

Summary

In most cases in Europe, slaughter bulls are fattened until 16-18 months of age (Faucon, 1986). In some countries male calves of dairy breeds - slaughtered at about one year of age and fattened with feed containing a high proportion of cereals to carcass weight of 180 - 220 kg - are used for the production of baby beef (Jarrige, Béranger 1992). In the Czech Republic, similar to other countries, the breeding structure of the Black Pied is changing and for this purpose only Holstein breeding bulls are used. The competitive capacity of these slaughter bulls usually fattened to 550 - 600 - 650 kg can be expected to decrease and this situation allows the application of more systems of beef production (Heinrich, Kögl, 1992).

The objective of the present study was to analyse selected results of meat efficiency and quality of carcasses of a Black Pied population with a proportion of Holstein breed of more than 87.5% fattened to a lower slaughter weight (SW), i.e. 170 - 209 kg, which was the main criterion. Data given in the present study were obtained within the framework of a grant project.

When fattening Holstein male calves and the Black Pied population with a higher than 87.5% proportion of this breed it can be expected that the carcass weight, dressing percentage and net gains, especially in dependence on the level of average daily gain, in slaughter animals slaughtered at lower live weights (330 - 430 kg) without negative selection during fattening and at average daily gains of 1048 g, will be 180 - 201 kg, 51.2 - 52.3% and 459 - 623 g, respectively.

With 51.8 kg as the average weight, the weight of the right hindquarters may range between 49.3 and 54.9 kg, especially in dependence on the carcass weight. The weight of the right forequarters ranges between 38.8 and 44.5 kg, the average weight being 41.4 kg, again in dependence on the weight of the carcass. The weight of the trimmings from both halves may be somewhat higher, what is connected with the tendency of the processing

Rad je priopćen na "48th Annual Meeting of EAAP", Vienna, August 25 – 28, 1997.

J. Soutor, G. Chládek, I. Ingr, Department of Animal Breeding, Department of Food Technolngy, Mendel University of Agriculture and Forestry Brno, Zemidilska 1, 61300 Brno, Czech Republic

industry wishing to present an attractive meat quality. It is possible to use male calves of dairy breeds in this way, especially when ensuring economy of fattening.

Introduction

In most cases in Europe, slaughter bulls are fattened until 16-18 months of age (Faucon, 1986). In some countries male calves of dairy breeds - slaughtered at about one year of age and fattened with feed containing a high proportion of cereals to carcass weight of 180 - 220 kg - are used for the production of baby beef (Jarrige, Béranger 1992). In the Czech Republic, similar to other countries, the breeding structure of the Black Pied is changing and for this purpose only Holstein breeding bulls are used. The competitive capacity of these slaughter bulls usually fattened to 550 - 600 - 650 kg can be expected to decrease and this situation allows the application of more systems of beef production (Heinrich, Kögl, 1992).

The objective of the present study was to analyse selected results of meat efficiency and quality of carcasses of a Black Pied population with a proportion of Holstein breed of more than 87.5% fattened to a lower slaughter weight (SW), i.e. 170 - 209 kg, which was the main criterion. Data given in the present study were obtained within the framework of a grant project.

Material and methods

Male calves of known origin (minimum proportion 87.5% Holstein) where bought from herds of Black Pied cattle where exclusively Holstein bulls were used for insemination. No negative selection was carried out during fattening. The male calves were housed in stanchionless sheds on sawdust litter to enable quantitative recording of feed uptake. Nutrition was ensured to reach 1250 g average daily gains in accordance with recommended tabular values for the fattening of bulls of dairy breeds (Sommer et al. 1994). The feed ration was based on ad libitum uptake of crushed grain (wheat + barley 1:1), loose protein concentrate which at the same time provided the necessary mineral substances and vitamins, and supplemented with one roughage - alfalfa hay representing, on average, 14.95% of the dry matter of the feed ration. The grain was crushed using roller crushers ENGL Potenciál 55-28 (input 5.5 kW) and ROMILL M 300 (input 5.5 kW).

In total 46 bulls were slaughtered gradually and on the day of slaughter the carcasses were weighed, as well as the kidneys, kidney fat, liver and spleen; these analyses and values are not the objective of the present study. Within 24 hours of slaughter the carcasses were cut (division of the carcass halves) using

the methods given for cutting and the right halves of the carcasses were used for further detailed investigations. The results were elaborated by multiple analysis of variance using the computer programme STATGRAPHICS, version 7.0.

Based on variant solution of the programme the 46 male calves were divided into two subgroups according to their carcass weight (CW) - (lower 170 -189 kg, higher 190 - 209 kg), and also into two subgroups according to daily gains (DG) - (lower level less than 999 g, higher level above 1000 g) and also into two subgroups according to the total amount of trimmings from both carcass halves (TR), the division between the lower and higher amount being 12 kg.

Results

From Tab. 1 it follows that the average live weight before slaughter (LW) of the set of 46 baby-beef bulls was 366 kg; if the carcass weight (CW) was 190 kg, then the dressing percentage (DP) reached 51.9%. The average age at slaughter (AG) was 360 days, the average daily gain (DG) before reaching this age was 1048 g and the net gain (NG) was 552 g.

Table 1. - SELECTED INDICATORS OF THE FATTENING CAPACITY

			1		2		3	
			CW (kg)		DG (g/day)		TR (kg)	
Indicator	Units	Average values	lower 170-189	higher 190-209	lower to 999	higher over 1000	lower to 11.9	higher over 12.0
No. of anim.	n	46	25	21	20	26	18	28
LW	kg	366.0	346.0 ^{A}	390.0 ^{B}	383.0 ^{a}	354.0 ^{b}	359.0	371.0
AG	kg	360.0	324.0 ^{A}	403.0 ^{B}	414.0 ^{A}	319.0 ^{B}	358.0	362.0
CW	kg	190.0	180.0 ^{A}	201.0 ^{B}	196.0	185.0	186.0 ^{a}	192.0 ^{b}
DP	%	51.9	52.1	51.6	51.2 ^{a}	52.3 ^{b}	51.9	51.8
DG	g	1048.0	1105.0	979.0	888.0 ^{A}	1171.0 ^{B}	1002.0 ^{a}	1077.0 ^{b}
NG	g	552.0	584.0	513.0	459.0 ^{A}	623.0 ^{B}	528.0 ^{a}	567.0 ^{b}

Comparisons of the two subgroups (Tab. 1. 1) showed the logically highly significantly higher LW, AG and CW, while the differences for DP, DG and NG where insignificant. With a higher level of DG (Tab. 1. 2) went the expected highly significantly higher values of DG and NG, significantly higher DP, and highly significantly lower AG and significantly lower LW. Combination of the differences in LW and DP resulted in an insignificant difference in CW. Evaluations of trimmings from both halves (TR) (Tab. 1. 3)

showed that the LW, AG and DP of both subgroups were balanced. The CW, DG and NG of the subgroup with a higher trimming weight were significantly higher.

Table 2. - WEIGHT OF RIGHT HINDQUARTERS AND SELECTED PARTS

			1		2		3	
			CW (kg)		DG (g/day)		TR (kg)	
Indicator	Units	Average values	lower 170-189	higher 190-209	lower to 999	higher over 1000	lower to 11.9	higher over 12.0
No. of anim.	n	46	25	21	20	26	18	28
WHQ	kg	51.8	49.3 ^{A}	54.9 ^{B}	53.4	50.7	51.1	52.3
RO	kg	18.5	18.2 ^{a}	18.9 ^{b}	18.3	18.6	21.0 ^{A}	17.0 ^{B}
SRL	kg	3.6	3.5	3.8	3.7	3.6	3.6	3.6
FI	kg	1.2	1.2	1.2	1.3	1.2	1.3	1.2
SHA	kg	1.8	1.5^{A}	2.2^{B}	2.2 ^{a}	1.6 ^{b}	1.4 ^{A}	2.1 ^{B}
TR	kg	7.0	6.4	7.7	7.3	6.8	3.6 ^{A}	9.2 ^{B}

Table 3. - WEIGHT OF RIGHT FOREQUARTERS AND SELECTED PARTS

			1		2		3	
			CW (kg)		DG (g/day)		TR (kg)	
Indicator	Units	Average values	lower 170-189	higher 190-209	lower to 999	higher over 1000	lower to 11.9	higher over 12.0
No. of anim.	n	46	25	21	20	26	18	28
WFQ	kg	41.4	38.8 ^{A}	44.5 ^{B}	44.0	39.5	41.6	41.3
SHO	kg	6.0	5.8 ^{A}	6.3 ^{B}	6.1	5.9	6.4 ^{A}	5.8 ^{B}
NE	kg	4.3	4.2	4.5	4.5	4.2	4.9 ^{A}	4.0 ^{B}
PR	kg	4.2	4.0 ^{a}	4.5 ^{b}	4.4	4.1	4.7 ^{A}	3.9 ^{B}
SHA	kg	3.5	3.4	3.7	3.7	3.4	3.6	3.5
TR	kg	5.3	4.8	6.0	5.7	5.1	3.2 ^{A}	6.8 ^{B}

CW = carcass weight; DG = daily gains; TR = trimmings from both halvers; WHQ = weight of hindquarter; RO = round; SRL = sirloin; FI = fillet; SHA = shank; WFQ = weight of forequarter; SHO = shoulder; NE = neck; PR = prime rib; LW = live weihgt before slaughter; AG = average age at slaughter; DP = dressing percentage; NG = net gains

The means with unlike superscripts in lines for 1, 2, 3 indicators are significantly (a, b - $P < 0.05$) resp. highly significantly (A, B - $P < 0.01$) different.

Evaluations of the weight of the right hindquarters (WHQ) given in Tab. 2 showed that the average weight of the hindquarter (WHQ) was 51.8 kg, the weight of the round (RO), sirloin (SRL), fillet (FI), shank (SHA) and total meat trimmings (TR) being 18.5 kg, 3.6 kg, 1.2 kg, 1.8 kg and 7.0 kg,

respectively. The highly significantly higher value of CW (Tab. 1. 1) also resulted in a highly significantly higher weight of WHO and SHA and significantly higher weight of RO. The weights of SRL, FI and TR where not significant, even though the tendency of SRL and TR was expressive enough (Tab. 2. 1). No statistically significant effect of NG on the weight of the individual selected parts of the carcass was found, with the excception of the weight of SHA (Tab. 2. 2). Its significance can be associated with differences following from Tab. 1. 2 (LW) and/or with the lower variability of this indicator. The technology of cutting of the hindquarters did not significantly affect the total weight, or the weight of SRL and FI (Tab. 2. 3). As was expected the TR weight was highly significant, as was the lower weight of RO. The highly significantly higher weight of SHA is apparently again the consequence of the combination of differences in CW (Tab. 1, 3), the tendency towards a higher weight of WHO (Tab. 2, 3) and the above mentioned lower variability of this part.

As concerns the forequarters (Tab. 3.) of the bulls of the subgroup with a higher CW, the weight of the forequarters (WFO) and shoulder (SHO) were found to be highly significantly higher, the weight of the prime rib (PR) significantly higher. The other values were insignificantly different. All the differences associated with lower and higher average DG were also statistically insignificant (Tab. 3. 2) what follows, after all, from the insignificant differences in CW (Tab. 1. 2). The technology of cutting of the forequarters did not affect the WFO and SHA only. The marked and highly significant TR also highly significantly reduced the weight of the SHO, neck (NE) and PR. If we take the ratio between the fore and hindquarters (Tabs. 2 and 3), the forequarters (41.4 kg) represent 44.4% and the hindquarters (51.8 kg) a relative 55.6%.

Discussion

The present study indicates what results of meat efficiency can be expected when finishing male calves of the Black Pied breed not only in the Czech Republic where the use of breeding bulls of the extremely dairy Holstein cattle is increasing. It is the lower limit of baby beef fattening as stated by Jarrige, Beránger (1992), also using a large amount of cereals in the feed ration. The dressing percentage of bulls of the expressively dairy type in the studied set is very close to values found by Anderson et al. (1991) in the Danish Black Pied cattle; with a slaughter weight similar to that studied by Nosál, Pavlič (1988), i.e. 350 kg, the dressing percentage of the bulls in the present study

was by 2.86% lower. This was caused by a certain percentage of genetic inheritance of the combined breed of the animals studied by the present authors.

The level of average daily gains (DG) of all bulls of the set (1048 g) as well as animals with a lower carcass weight (CW), i.e. 1105 g, corresponds with the results of Arpacik et al. (1994). The results achieved in the present study in terms of the weight of the fore and hindquarters (44.4% and 55.6%, respectively) do not differ very much from values common for heavier bulls of 506 kg average live weight, as given by Dvořák (1987), i.e. 45.7% and 54.3%, respectively. The results of Urban et al. (1976) and Teslík et al. (1995) with the same breed or with hybrids with a high proportion of this breed are different, particularly due to the different slaughter weight. We can agree with the conclusions of Griffin et al. (1992) that dairy types are lower yielding.

Conclusion

When fattening Holstein male calves and the Black Pied population with a higher than 87.5% proportion of this breed it can be expected that the carcass weight, dressing percentage and net gains, especially in dependence on the level of average daily gain, in slaughter animals slaughtered at lower live weights (330 - 430 kg) without negative selection during fattening and at average daily gains of 1048 g, will be 180 - 201 kg, 51.2 - 52.3% and 459 - 623 g, respectively.

With 51.8 kg as the average weight, the weight of the right hindquarters may range between 49.3 and 54.9 kg, especially in dependence on the carcass weight. The weight of the right forequarters ranges between 38.8 and 44.5 kg, the average weight being 41.4 kg, again in dependence on the weight of the carcass. The weight of the trimmings from both halves may be somewhat higher, what is connected with the tendency of the processing industry wishing to present an attractive meat quality. It is possible to use male calves of dairy breeds in this way, especially when ensuring economy of fattening.

Acknowledgement

The authors wish to thank the Grant Agency of the Czech Republic for providing the funds which enabled to carry out the project (Grant registration No. 507/93/1248).

LITERATURE

1. Anderson, H.F., C. C. Krohn, J. Foldager, L. Munksgaard, S. Klastrup (1991): Influence of housing and feeding on behaviour, feed intake, growth, carcass and meat quality. Beretning fra Statens Husdyrbrugsforsog, no. 700, 33 pp.
2. Arpacik, R., A. Nazligul, Z. Beyhan, F. Atasoy (1994): The effect of initial weight on fattening traits and economic efficiency in Turkish Brown bulls. Lalahan - Hayvancilik – Arastirma – Enstitusu - Dergisi, 34, 1- 2, 79 - 89.
3. Dvořák, Z. (1987): Nutritional evaluation of meat of slaughter animals. 1. ed. Praha, SNTL, 272 s.
4. Faucon, A. (1986): Situation actuelle et évolution récente des différents types de production de viande bovine et leur marché. In: D. Micol (Editor), Production de Viande Bovine - I. N. R. A, Paris, pp. 7 - 32.
5. Griffin, D.B., J.W. Savell, J.B. Morgan, R.P. Garrett, H.R. Cross (1992): Estimates of subprimal yields from beef carcasses as affected by USDA grades, subcutaneous fat trim level, and carcass sex class and type. J. Anim. Sci., 70, 8, 2411 - 2430.
6. Heinrich, I., H. Kögl (1992): Rindfleischerzeugung in Europa. Schiftenreihe des Bundesministers für Ernährung, Landwirtschaft und Forsten, heft 409, Landwirtschaftsverlag GmbH 4400 Münster-Hiltrup,179 s.
7. Jarrige, R., C. Béranger (1992): Beef Cattle Production. World Animal Science, C 5, Elsevier Amsterdam, 487 s.
8. Nosál, V., M. Pavlič (1988): Carcass quality of bulls with a large proportion of Dutch Black Pied inheritance, finished to lower body weights. Živočišná Výroba, 33, č. 9. 809 - 820.
9. Sommer, A. et al. (1994): Nutrient requirements and tables of the nutritional quality of feeds for ruminants. ČAZV, komise výživy hospodářských zvířat 1. ed. Pohořelice, ČZS VUVZ, 198 s.
10. Teslík, V., J. Burda, F. Urban, L. Bartoň, D. Řehák (1995): Meat efficiency of bulls of the Bohemian Spotted and Black Pied cattle under intensive fattening to a weight of 530 kg. Živočišná Výroba, 40, č. 5, 227 - 232.
11. Urban, F., M. Dvořáček, J. Volek (1976): Results of research into meat efficiency when crossing with Black Pied Lowland cattle. Živočišná Výroba, 21, č. 2, 103-110.

PARAMETRI TOVLJENJA I VRIJEDNOST POLOVICA BABY-BEEF-a HOLSTEIN BIKOVA DO 330 – 430 kg ŽIVE VAGE

Sažetak

U većini slučajeva u Europi bikovi za klanje tove se do dobi od l6 - 18 mjeseci (Faucon, 1986.). U nekim zemljama za proizvodnju baby-beef-a upotrebljava se muška telad mliječnih pasmina i kolje u dobi oko jedne godine a tovi krmom s velikim udjelom žitarica do klaoničke težine od 180-220 kg. (Jarrige, Beranger, 1992.). U Češkoj Republici, slično drugim zemljama, uzgojna struktura Black Pied-a se mijenja i zato se upotrebljavaju samo rasplodni bikovi Holstein. Sposobnost takmičenja ovih bikova za klanje, što se obično tove do 550-600-650 kg očekuje se da će se smanjiti i u takvoj situaciji moguća je primjena više sustava proizvodnje govedine (Heinrich, Kögl, 1992.).

Cilj je ovog rada bio analizirati odabrane rezultate djelotvornosti mesa i kakvoće polovica populacije Black Pied s omjerom višim od 87,5% pasmine Holstein, tovljene do manje klaoničke težine (SW), tj. 170 - 209 kg, što je bio glavni kriterij.

Može se očekivati da će težina polovica, postotak randmana, neto prirasti, osobito ovisno o razini prosječnog dnevnog prirasta, u životinja niže žive vage kod klanja (330-430 kg) bez negativne selekcije tijekom tovljenja i uz prosječne dnevne priraste od 1048 g, biti 180 - 201 kg, 51,2 – 52,3% odnosno 459 – 623 g.

Sa 51,8 kg prosječne težine, težina desnih stražnjih četvrtina može se kretati između 49,3 i 54,9 kg, ovisno o težini polovica. Težina desnih prednjih četvrtina iznosi između 38,8 i 44,5 kg, a prosječna težina 41,4 kg, opet ovisno o težini polovica. Težina otpadaka obiju polovica može biti nešto viša, što je u vezi s tendencijom prerađivačke industrije da nudi privlačnije meso.

Na taj je način moguće upotrijebiti mušku telad mliječnih pasmina, naročito kada se osigura ekonomičnost tovljenja.

Primljeno: 10. 7. 1998.