

GROWTH LEVEL AND SEMEN PRODUCTION IN CZECH PIED BULLS IN THE PERIOD OF THEIR GROWTH ABILITY TEST

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Growth ability of 156 bulls of Czech Pied cattle and their semen production was investigated in central bull station. Within the period of bulls own growth ability test from 111 to 420 days of age the bulls reached the daily weight gain of 1 278 g ($s_{\bar{x}} = 98.53$). A dependence between the weight gain in test and body measurements (height at withers, body length, heart girth, pelvis length and height at hips, $r = 0.27-0.40$, $P < 0.001$) was found. Dependence between the ejaculate volume and body measurements investigated (weight gain in test, height at withers and height at hips) was $r = 0.21$ ($P < 0.01$). Total number of sperms in the ejaculate was 6.30×10^9 ($s_{\bar{x}} = 1.81$). The dependence between the number of active sperms and height at withers was significant ($P < 0.01$).

bull; growth test; body measurements; sperms

INTRODUCTION

The breeding work belongs to most efficient intensification measures in animal production by its high returnability of invested finance and long-term generation effect. Current breeding programmes use biotechnological methods of reproduction in their strategy where they prefer young sires due to acceleration of genetic progress and from the point of view of higher biological activity of their semen.

In the centre of concern of breeders and growers is more and more the requirement of earliness as an important productivity trait of important economic effect because it enables early introduction of young animals into breeding, shortens a generation interval and makes possible more effective utilization of other productivity properties of a given breed.

Changing conditions of the animal breeding and increasing demands for productivity of cattle breeds call for running study of growth ability and quality of semen of young bulls.

The effect of nutrition level on semen production and quality was studied by Wilsey et al. (1971), Louda (1972), Pilát et al. (1973), Louda, Šmerha (1974, 1976), Cates et al. (1981), Coulter et al. (1982).

Growth ability of young bulls and size of testicles were in the centre of attention of Grazer, Raznozík (1992), Rao et al. (1992) and others.

MATERIAL AND METHOD

The test consisted of 156 bulls of Czech Pied cattle in which weight gains in the test for growth ability from 110 to 420 days of age, height at withers at 365 days of age, height at hips at 365 days, diagonal body length at 365 days, heart girth at 365 days of age, pelvis length and width at 365 days of age were studied. In addition, the following indicators of the semen quality investigated: volume in cm^3 , activity of sperms in %, concentration $\times 10^6$ in mm^3 and volume of abnormal sperms in %. In the data obtained basic statistical characteristics and correlation dependences between investigated indicators were determined.

RESULTS AND DISCUSSION

In the set of 156 bulls mathematical and statistical methods were used to find basic statistical characteristics and values of correlation coefficients among investigated indicators of body measurements and quality of produced semen.

The tested bulls of Czech Pied cattle reached average weight gains in the test 1 278 g ($s_{\bar{x}} = 98.533$), Tab. I. Correlations between weight gains in the test and investigated body measurements were highly significant ($P < 0.001$; $r = 0.27$ to 0.40). Correlation to spermatological indicators was significant only to the volume of ejaculate ($r = 0.21$; $P < 0.01$) and to the counts of abnormal sperms ($r = 0.17$; $P < 0.05$). Correlations to other investigated spermatological indicators were insignificant (Tab. II).

Height at withers was 126.07 on average ($s_{\bar{x}} = 2.136$). Correlation between height at withers and studied body measurements was significant and ranged from $r = 0.19$ to $r = 0.91$. Correlation with spermatological indicators was significant to the ejaculate volume ($r = 0.21$, $P < 0.01$) and to the sperm counts in the ejaculate ($r = 0.26$, $P < 0.01$). Correlations to other spermatological indicators were insignificant.

Average body length in the investigated set of bulls was 153.51 cm ($s_{\bar{x}} = 4.543$). Correlation between body length and investigated body measurements was significant ($r = 0.17$ – 0.51), except for pelvis width with which it had not

I. Basic statistical characteristics in Czech Pied bulls in the period of their growth ability test

Indicator	\bar{x}	$s_{\bar{x}}$
Weight gain in test in g	1 278.00	98.533
Height at withers in cm	126.05	2.136
Body length in cm	153.51	4.543
Heart girth in cm	176.96	5.075
Pelvis width in cm	45.57	1.563
Pelvis length in cm	47.58	1.599
Height at hips in cm	127.00	2.221
Volume of ejaculate in cm^3	3.83	0.734
Concentration of sperms $\times 10^6$ in mm^3	1.60	0.295
Activity of sperms in %	66.97	5.419
Abnormal sperms in %	15.37	4.809
Total counts of sperms $\times 10^9$	6.30	1.817
Counts of active sperms $\times 10^9$	4.29	1.395

statistically significant relationship. Statistically significant correlation to none of the investigated spermatological indicators was confirmed as well.

The heart girth reached average values 176.96 cm ($s_{\bar{x}} = 5.075$). Correlations between heart girth and other body measurements was statistically significant and ranged from $r = 0.17$ to 0.45). Correlations of heart girth to spermatological indicators were not significant.

Pelvis width was 45.75 cm ($s_{\bar{x}} = 1.563$) in studied set of bulls and significantly correlated with other body measurements ($r = 0.17$ to 0.88), except for body length with which significant correlation was not confirmed. Correlation between pelvis width and investigated spermatological indicators was statistically significant.

Average pelvis length in the studied set of bulls was 47.58 cm ($s_{\bar{x}} = 1.563$). Correlation between pelvis length and investigated body measurements was significant ($r = 0.17$ – 0.88). Correlation with investigated indicators of the quality of ejaculate was insignificant.

Height at hips was 127.00 cm ($s_{\bar{x}} = 2.221$) in the tested set of bulls. Correlations between height at hips and investigated body indicators were highly significant ($r = 0.18$ – 0.91 , $P < 0.001$), except for pelvis length ($r = 0.21$; $P < 0.01$).

The volume of ejaculate in the tested set of bulls reached average value 3.83 cm^3 . Correlation between the volume of ejaculate and tested body mea-

II. Values of correlation coefficients between tested indicators in Czech Pied bulls in the period of their growth ability test

Indicator	PRI	VYS	DEL	OBV	SIR	DPA	VKR	OBJ	KON	AKT	ABN	CEL	CEA
PRI													
VYS	0.40												
DEL	0.24	0.51											
OBV	0.35	0.45	0.48										
SIR	0.27	0.20	0.14	0.17									
DPA	0.29	0.19	0.17	0.22	0.88								
VKR	0.39	0.91	0.48	0.39	0.18	0.20							
OBJ	0.21	0.22	0.14	0.01	-0.02	-0.05	0.21						
KON	-0.05	0.14	-0.02	0.15	-0.08	-0.09	0.08	0.17					
AKT	0.09	0.13	0.15	0.09	-0.06	-0.06	0.13	0.31	0.31				
ABN	0.17	-0.07	-0.05	0.03	0.09	-0.06	0.13	-0.42	-0.13	-0.42			
CEL	0.13	0.26	0.11	0.12	-0.07	-0.07	0.21	0.79	0.72	0.33	-0.10		
CEA	0.13	0.26	0.13	0.12	-0.05	-0.15	0.21	0.75	0.70	0.53	-0.18	0.97	

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$

PRI = weight gain during the test, VYS = height at withers, DEL = diagonal body length, OBV = heart girth, SIR = pelvis width, DPA = pelvis length, VKR = height at hips, OBJ = volume of ejaculate, KON = concentration of sperms, AKT = activities of sperms, ABN = abnormal sperms, CEL = total counts of sperms, CEA = total counts of active sperms

measurements was significant only to the weight gain in the test, to the height at hips ($r = 0.21$; $P < 0.01$) and to height at withers ($r = 0.22$; $P < 0.01$). Correlations between the volume of ejaculate and tested spermatological indicators, except for counts of abnormal sperms, were significant and ranged from $r = 0.17$ to 0.79 .

Concentration of sperms in ejaculate in the tested set of bulls was 1.60×10^6 in mm^3 on average ($s_{\bar{x}} = 0.295$). Correlations between concentrations of sperms and tested body measurements were insignificant. Only correlation with spermatological indicators was confirmed, except for the counts of abnormal sperms ($r = 0.17-0.72$).

Activity of sperms before freezing was 66.97% ($s_{\bar{x}} = 5.419$) in the tested set of bulls. Correlations between activity of sperms and tested body measurements were insignificant. Only correlation to the other spermatological indicators was confirmed ($r = 0.42-0.53$).

Frequency of occurrence of abnormal sperms in the ejaculate of the tested bulls amounted to 15.3% ($s_{\bar{x}} = 4.809$). Dependence between the occurrence of pathological sperms and growth ability of bulls was found along with significant dependence between frequency of pathological sperms and activity of ejaculate. In young bulls the frequency of pathological sperms in ejaculate is falling with increasing activity.

Total counts of sperms were in the tested bulls 6.30×10^9 ($s_{\bar{x}} = 1.817$). Of the tested body measurements only correlation to the height at withers ($r = 0.26$; $P < 0.01$) and at hips ($r = 0.21$; $P < 0.01$). Correlations between total counts of sperms and the other spermatological indicators were significant ($r = 0.33-0.97$), except for volume of abnormal sperms.

Counts of active sperms were on average 4.29×10^9 ($s_{\bar{x}} = 1.395$). Correlation dependences found between counts of active sperms and tested body measurements were significant only in height at withers ($r = 0.26$; $P < 0.01$) and in height at hips ($r = 0.21$; $P < 0.01$). In the other spermatological indicators significant dependences were found ($r = -0.18$ to 0.97).

As to the correlation dependences between weight gains in the test and indicators of the quality of ejaculate, correlations found were statistically significant only to the volume of ejaculate and counts of abnormal sperms. Significant correlation to other indicators was not confirmed. Similar findings are presented by Louda (1972) and Louda, Šmerha (1976). As to the body measurements, correlations found were statistically significant only between height at withers and at hips and volume of ejaculate, the total counts of sperms and counts of active sperms. The values of indicators of quality of ejaculate found in the central bull station were higher than the values presented by Pilát et al. (1973) and Cates et al. (1981).

In conclusion it can be said that growth ability of bulls found in the test for own growth ability (average daily weight gain 1 278 g) had no negative impact on the quality of ejaculate in the tested Czech Pied bulls.

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Úroveň růstu a produkce spermatu u býků českého strakatého skotu v období testu vlastní růstové schopnosti.

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Růstová schopnost 156 býků českého strakatého skotu a produkce spermatu byla sledována v centrální odchovně býků. V období testu vlastní růstové schopnosti býků od 111 do 420 dnů věku dosáhli býci denního přírůstku 1 278 g ($s_{\bar{x}} = 98,53$). Byla

zjištěna závislost mezi přírůstkem v testu a tělesnými rozměry (kohoutkovou výškou, délkou těla, obvodem hrudníku, délkou pánve a výškou v kříži) ($r = 0,27-0,40$, $P < 0,001$).

Závislost mezi objemem ejakulátu a sledovanými tělesnými rozměry (přírůstkem v testu, výškou v kohoutku a výškou v kříži) činila $r = 0,21$ ($P < 0,01$). Byl zjištěn celkový počet spermií v ejakulátu $6,30 \times 10^9$ ($s_{\bar{x}} = 1,81$). Závislost mezi počtem aktivních spermií a kohoutkovou výškou byla průkazná ($P < 0,01$).

býk; růstový test; tělesné rozměry; sperma

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