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Central performance test results of Hungarian Simmental Bulls

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ABSTRACT

Central performance test results of 288 dual purposes Hungarian Simmental bulls kept at the same condition in small groups were evaluated between 1994–2007. The nutrition of animals was based on hay and ad libitum concentrate. The bulls were weighing at the beginning and at the end of performance test and monthly during the test. At the end of performance test the bulls were qualifying. The average age with standard deviation of bulls at the beginning of performance test was 237±54 days. Average weight at the beginning of performance test was 297±85 kg, while the final weight was 545±71 kg. Daily gain during performance test was 1715±254 g and from birth to the end of performance test 1425±134 g/day. Due the central performance test, the genetic trend in spite of the year effects was obtained.
(Keywords: daily gain, average weight, growth rate)

ÖSSZEFOGLALÁS

Központi saját teljesítmény vizsgálati eredmények a magyar tarka fajtában
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A szerzők 22 tenyészetből származó 288 kettős hasznosítású magyar tarka növendék bika központi saját teljesítmény vizsgálatban elért eredményeit értékelték 1994 és 2007 közötti időszakban. A bikákat kötetlen kiscsoportos rendszerben tartották, takarmányozásuk a hazai marhahízlalási gyakorlatnak megfelelően réti szénára és abraktakarmányra alapozódott a hízlalás ideje alatt. Az állatokat a vizsgálat elején és végén, valamint a vizsgálat során havi rendszerességgel mérlegelték. Az STV zárásakor sor került a minősítésre. A vizsgálatok során mért, illetve számolt eredmények átlag és szórás értékei a következők voltak: a bikák életkora beállításkor átlagosan 237±54 nap volt. Beállítási súlyuk átlagosan 297±85 kg volt, záráskor pedig 545±71 kg-os súlyt értek el. Az STV alatt elért súlygyarapodás átlagosan 1715±254 g/nap volt, az életnapi súlygyarapodás pedig 1425±134 g/nap. A központi teljesítményvizsgálat egyik előnye, hogy a figyelemreméltó évjárati hatások ellenére a genetikai trend megállapítható.
(Kulcsszavak: napi súlygyarapodás, átlagos súly, növekedési erély)

INTRODUCTION

Hungarian Simmental cattle breed plays important role both as a dual purpose, and as a specialized beef breeds. Breeding programmes and qualification of breeding bulls of this bred are organized by the Association of the Breeders of Hungarian Simmental Cattle as a member of the Federation of European Simmental Cattle Breeders.

The candidate bull calves born at seed stock herds are carried to the central performance test station for the examination. After closing the test the candidate bulls are qualified, where they get the following qualifications: suitable for artificial insemination or natural mating or unsuitable for further breeding. The breeding bulls, nominees as suitable for artificial insemination in both the dual and beef stocks, take part in progeny test.

Performance testing, in many situations, focuses on how a bull performs in terms of average daily gain. The purpose of testing is to see how individual animals perform as well as provide a means of improving efficiency of beef production by improving herds of cattle.

Central performance testing allows the comparison of beef bulls of different herds at standard conditions to identify genetically superior bulls for using in commercial herds. For accurate evaluation of growth potential of beef bulls, it is necessary to identify important factors that affect their growth at test. Several studies have shown that herd of origin affects on growth traits during the test period (*Dalton,* 1976; *Dalton and Morris,* 1978; *Morris,* 1981; *Tong et al.,* 1986; *Amal and Crow,* 1987). *Wolf* (1978) *Mészáros* (1983) and *Polgár* (1997) reported some other factors which have a dominant impact on the progeny of bulls, such as intensity on nutrition, keeping individually or in groups, etc. The advantage of selection of breeding bull candidates of Hungarian dual purpose Simmental breed that there are reared more or less at similar conditions in the calf rearing units. Further advantage of the selection process of Simmental breed, that the growth performance test is hold in the central station, at similar conditions.

In our study the daily gain of all Hungarian Simmental bull candidates over the last few decades was investigated. A further aim was to detect the genetic trend and the year effects on the gain of progeny of the Simmental bull population.

MATERIALS AND METHODS

Performance test results of 288 Hungarian Simmental bulls kept in the same condition were evaluated between 1994 and 2007. The bulls were kept individually in a 16 m^2 box. The feeding of young bulls was ad libitum based on concentrate and hay. The concentrate contents are DDGS, triticale and wheat, and also corn and premix. The average consumption of bulls in the whole period was 4–5 kg/day of hay and 7 kg/day of concentrate. There was a test station at Szombathely where the test was started but later the performance test place changed, in 2007 the test was at Gödöllő and now it is at Ják. The bulls were weighing at the beginning of performance test and at the end and monthly during the performance test. The average age of bulls, age at the end of performance test, weight data at the beginning of performance test, final weight of performance test, total gain during the performance test, daily gain during performance test, daily gain from birth to the end of performance test were evaluated. When bulls finished performance test there was a phenotypic judging. Bulls were selected and categorized by the pedigree index of milk production, muscle scores and average daily gain.

The different categories were:

- Category 1: 130 over the average in the case of pedigree index of milk production, conformation score over 7 point, daily gain on performance test by 10% over the average.
- Category 2: 119 over the average in the case of pedigree index of milk production, conformation score over 5.5 point, daily gain on the performance test over the average.
- Category 3: under the standards.

The bulls of category 1 were sent to AI, the bulls from category 2 to natural breeding, and the bulls in category 3 unsuitable for breeding and selected. For statistical analyses *MS Excel* (2002) and *SPSS for Windows* (1998) were used.

RESULTS AND DISCUSSION

Some authors reported 1000 g/day daily gain during the fattening in 50's and 60's years, and 1000–1300 g/day in 70's years, and 1200–1400 g/day later (*Table 1*). According to the literature and practical experience, Hungarian Simmental has a reasonable growth capacity. Moreover there are results from German Simmental in 1991 and 2006 show the same trend. (*Nagy et al.,* 1991, *Dirk et al.,* 2006) These results are important for evaluating our results and for making correct conclusions on that.

Table 1

Daily gain data of Simmental young bulls in different years (Literature data)

Author	Genotype	Number of animals	Daily gain during the test period
			g/day
Kralovánszky et al.(1957)	HS*	-	1097
Bocsor (1960)	HS	-	1008
Bárczy et al. (1963)	HS	26	978
*Balika and Somogyi (*1971)	HS	13	1354
Dohy-Keleméry (1971)	HS	84	1054
Nagy Z-né (1973)	HS	11419	1101
Bencze et al. (1978)	S	13	1409
Nagy N.(1982)	HS	68	1344
Bozó et al. (1989)	HS	8	1247
Nagy et al. (1991)	HS	42	1843
Polgár (1997)	HS	389	1222
Füller et al. (2004)	HS	244	1177
OMMI (2005)	HS	34	1566
Dirk et al. (2006)	GS	16	1400
Brown A.H. (1991)	GS	357	1650

*HS =Hungarian Simmental; S=Simmental; GS= German Simmental

1. táblázat: Magyartarka bikák súlygyarapodási értéke különböző években (Irodalmi áttekintés)

Table 2 shows the statistics of age data of the animals at the beginning of performance test. As the results show the average age of the 288 young Simmental bulls was 237±54 days. It is seen from the table that the average age shows increasing trend. While the test in 90's was started at 180–210 days age of bulls, in 2000's the average age increased to 231 to 294 days. The background of this is the development of calf rearing systems in the farms. Nowadays the feeding and handling of calves are more correct, and the rearing time became longer. This development was not uninterrupted, decline in daily gain was observed in some years, in which epidemics of calf diseases (coli, IBR etc.) may play an important role.

Table 2

Statistic of age data of bulls at the beginning of performance test (day)

Year	Number of animals	*Mean value ($\bar{X}$)	Standard deviation (s)	cv%	Min	Max
		Age (day)				
1994	16	196.69 ^{abc}	35.57	18.08	133	261
1995	18	169.00 ^{a}	20.91	12.37	135	210
1996	26	185.77 ^{ab}	25.95	13.97	144	250
1997	13	198.54 ^{abc}	19.97	10.06	162	232
1998	18	213.06 ^{bcde}	29.02	13.62	168	274
1999	17	208.29 ^{abcd}	38.48	18.47	150	278
2000	27	230.70 ^{cdef}	50.08	21.71	169	376
2001	30	248.90 ^{defg}	37.38	15.02	178	354
2002	15	251.53 ^{efg}	18.76	7.46	223	283
2003	20	248.00 ^{defg}	41.06	16.56	195	308
2004	24	285.83 ^{gh}	41.44	14.50	223	394
2005	23	279.13 ^{gh}	47.20	16.91	208	385
2006	25	294.36 ^{h}	46.71	15.87	204	407
2007	15	273.93 ^{fgh}	41.61	15.19	206	342
Total	**288**	**237.41**	**53.67**	**22.61**	**133**	**407**

*Years without the same superscript differ significantly (P<0.05) (*az azonos betűt nem tartalmazó évek átlaga szignifikánsan (P<0,05) különböznek egymástól*)

2. táblázat: A KSTV-ben szereplő növendék bikák életkora a vizsgálat kezdetekor (nap)

Table 3 contains the weight data of bulls at the beginning of test. The average initial weight of tested bulls was 297±85 kg. The trend of weight at the beginning of test shows the trend of age. Namely, the average data are not continuously, but increasing from 1994 up to 2007.

Table 4 summaries the weight data at the end of performance test. As the results show, the average final weight of bulls was 545±71 kg. The final weight doesn't show the same trend as the age or initial weight. That means the qualification of candidate Simmental bull happened at the same weight. (500–550 kg). According to the *Table 5* the average daily gain during performance test was 1715±254 g/day. Higher rate of the daily gain from birth to the end of performance test was obtained than the published

results from previous studies. For example *Balika and Somogyi* (1971) evaluated the daily gain from birth to the end of performance test, for Hungarian Simmental got 1125 g/day. This result is lower than data obtained in the present study.

Table 3

Statistic of weight data of the animals at the beginning of performance test (kg)

Year	Number of animals	*Mean value ($\bar{X}$)	standard deviation (s)	cv%	Min	Max
		Weight data (kg)				
1994	16	170.06 ^{a}	40.90	24.05	116	281
1995	18	229.17 ^{ab}	43.59	19.02	140	315
1996	26	246.23 ^{bc}	50.36	20.45	134	336
1997	13	235.62 ^{ab}	42.08	17.86	173	310
1998	18	273.50 ^{bcd}	32.02	11.71	215	341
1999	17	261.41 ^{bcd}	71.14	27.21	182	408
2000	27	278.37 ^{bcd}	91.86	33.00	173	515
2001	30	309.90 ^{cde}	76.08	24.55	161	501
2002	15	280.33 ^{bcd}	55.31	19.73	211	386
2003	20	324.45 ^{def}	62.04	19.12	213	432
2004	24	387.71 ^{f}	61.73	15.92	297	555
2005	23	351.43 ^{ef}	59.33	16.88	233	452
2006	25	373.80 ^{ef}	72.94	19.51	200	506
2007	15	360.00 ^{ef}	65.67	18.24	223	467
Total	**288**	**297.11**	**85.40**	**28.75**	**116**	**555**

*As it is seen in *Table 2*. (*Lásd 2. táblázat*)

3. táblázat: KSTV-t kezdő tenyészbikajelöltek élősúlya különböző évjáratokban (kg)

Table 6 and *Figure 1* shows the daily gain data for the whole life period from birth to the end of performance test. The average daily gain from birth to the end of performance test was 1425±134 g/day. These daily gain data show better performance than it was found in the previous study (*Balika and Somogyi*, 1971).

Interesting point in our study is the classification of the bulls after the central performance test 26% of bulls got to category 1, and used for breeding with AI, 68% got to category 2 for natural breeding, and 6% were unsuitable for further breeding. Summarize the results, we found that the Hungarian Simmental bulls went to the performance station in younger age in 1990's than after 2000, when the age and weight at the beginning of performance test was higher. As the data comes from standard feeding and keeping condition, it can reflect the correct performance results. According to our opinion these results are quite representative and it can show the genetic ability of Hungarian Simmental cattle for growth. Accordingly, the growth range of Hungarian Simmental breed is reasonably high compared to other large framed beef breeds.

Table 4

Statistic of final weight data of performance tested bulls (kg)

Year	Number of animals	*Mean value ($\bar{X}$)	standard deviation (s)	cv%	Min	Max
		Final weight (kg)				
1994	16	438.31 [a]	36.08	8.23	377	520
1995	18	498.72 [ab]	53.56	10.74	404	593
1996	26	526.27 [b]	54.65	10.38	398	623
1997	13	522.46 [bc]	40.70	7.79	447	575
1998	18	531.78 [bc]	54.00	10.15	419	625
1999	17	543.18 [bc]	71.81	13.22	433	675
2000	27	546.89 [bc]	84.96	15.54	396	769
2001	30	580.10 [c]	71.46	12.32	436	746
2002	15	539.40 [bc]	48.60	9.01	458	630
2003	20	548.70 [bc]	55.62	10.14	440	650
2004	24	586.25 [c]	62.81	10.71	459	731
2005	23	552.30 [bc]	59.64	10.80	456	692
2006	25	580.48 [c]	77.65	13.38	391	726
2007	15	570.60 [bc]	59.16	10.37	479	701
Total	**288**	**544.52**	**71.11**	**13.06**	**377**	**769**

*As it is seen in *Table 2.* (*Lásd 2. táblázat*)

4 táblázat: KSTV-t zárt tenyészbikajelöltek élősúlya különböző évjáratokban (kg)

Although the weight is bigger at the beginning of performance test nowadays than it was in the 90's, it is not influenced dominantly by the progeny of bulls. The standard deviation of daily gain during the performance test is higher than the case of the live weight gain, within year and on the whole life period too.

Table 5

Daily gain of bulls during the performance test (g/day)

Year	Number of animals	*Mean value ($\bar{X}$)	standard deviation (s)	cv%	Min	Max
		Daily gain (g/nap)				
1994	16	1950.11[bc]	194.79	9.99	1422.62	2211.68
1995	18	1604.50[a]	138.58	8.64	1398.81	1869.05
1996	26	1666.90[a]	126.78	7.61	1434.52	1952.38
1997	13	1707.42[a]	109.24	6.40	1470.24	1886.90
1998	18	1610.74[a]	138.18	8.58	1335.37	1827.38
1999	17	1683.04[a]	110.53	6.57	1467.84	1930.38
2000	27	1598.32[a]	216.32	13.53	1220.24	2035.71
2001	30	1674.40[a]	184.54	11.02	1422.62	2220.18
2002	15	2067.48[c]	416.78	20.16	1350.99	2908.26

2003	20	1972.05[bc]	357.30	18.12	1570.25	2693.07
2004	24	1638.51[a]	231.70	14.14	1245.90	1967.21
2005	23	1619.76[a]	201.93	12.47	1226.56	1944.44
2006	25	1678.28[a]	218.87	13.04	1169.35	2096.77
2007	15	1754.93[ab]	238.37	13.58	1291.67	2133.33
Total	**288**	**1714.52**	**253.94**	**14.81**	**1169.35**	**2908.26**

*As it is seen in *Table 2*. (*Lásd 2. táblázat*)

5. táblázat: Tenyészbika jelöltek súlygyarapodás a KSTV alatt (g/nap)

Table 6

Daily gain of bulls from birth to the end of performance test (g/day)

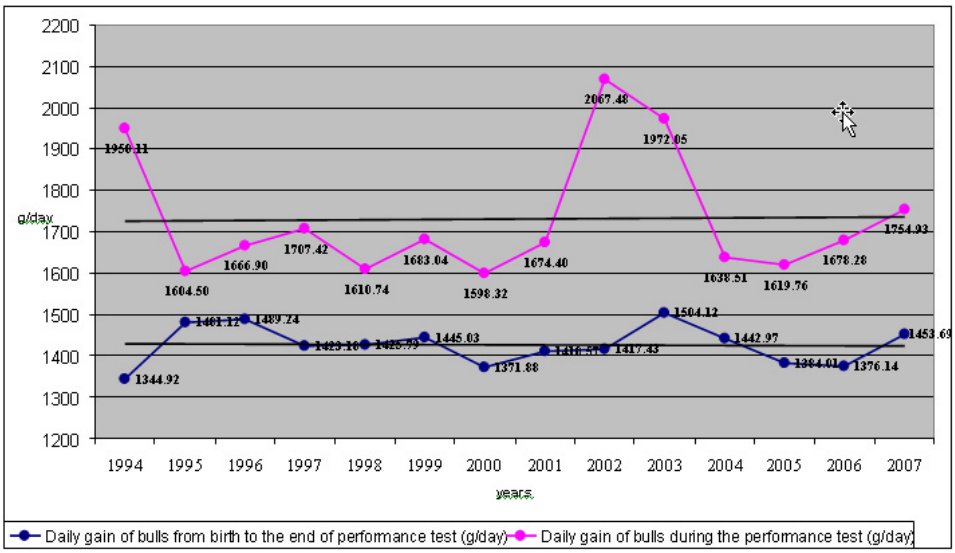
Year	Number of animals	* Mean value ($\bar{X}$)	standard deviation (s)	cv%	Min	Max
		Daily gain (g/nap)				
1994	16	1344.92[a]	202.52	15.06	1021.68	1634.24
1995	18	1481.12[ab]	143.79	9.71	1224.78	1677.02
1996	26	1489.24[b]	129.55	8.70	1248.66	1733.33
1997	13	1423.18[ab]	93.70	6.58	1208.11	1530.30
1998	18	1425.79[ab]	118.85	8.34	1160.38	1607.67
1999	17	1445.03[ab]	113.90	7.88	1209.50	1599.53
2000	27	1371.88[ab]	135.14	9.85	987.53	1655.98
2001	30	1410.57[ab]	127.34	9.03	1009.26	1616.34
2002	15	1417.43[ab]	100.98	7.12	1247.96	1560.85
2003	20	1504.12[b]	147.60	9.81	1234.72	1754.66
2004	24	1442.97[ab]	104.40	7.24	1264.96	1724.14
2005	23	1384.01[ab]	124.91	9.03	1140.27	1664.88
2006	25	1376.14[ab]	111.23	8.08	1089.36	1528.60
2007	15	1453.69[ab]	119.14	8.20	1204.28	1736.20
Total	**288**	**1424.97**	**133.73**	**9.38**	**987.53**	**1754.66**

*As it is seen in *Table 2*. (*Lásd 2. táblázat*)

6. táblázat: Tenyészbikajelöltek életnapi súlygyarapodása a sajátteljesítmény-vizsgálat befejezéséig (g/nap)

Figure 1

Daily gain data and trend of Hungarian Simmental bulls during the test period (g/day)



1.ábra: Tenyészbikajelöltek életnapi és KSTV alatti súlygyarapodásának értékei és trendje (g/nap)

CONCLUSIONS

Based on the results of the study for performance test, in spite of the parallel selection of milk and beef, Hungarian Simmental candidate breeding bulls have a very good growth capacity. The obtained gain 1425 g/day from birth to the end of the test and 1715 g/day during the test can be concluded as outstanding results. With these high growth rate results Hungarian Simmental is able to reach a good position among specialized beef cattle breeds.

25 percent of all bull candidates were classified into the best breeding category according their pedigree index based on milk production, conformation and growth capacity.

In the future it would be necessary to standardize the feeding and handling criteria as well as the starting and finishing of fattening period. The central performance test system might be a step towards this aim.

REFERENCES

Amal, S., Crow. G.H. (1987). Herd of origin effects on the performance of station-tested beef bulls. Can. J. Anim. Sci., 67. 349.

Balika S., Somogyi S. (1971). A száraz takarmánykeverékkel hizlalt magyartarka növendék hízóbikák hizlalási és vágási eredményei Állattenyésztés. 20. 2. 109-120.

Bárczy G., Boda I., Gondolovics L. (1963). Magyartarka x charolais F1 és magyar tarka növendékbikák összehasonlító hizlalása Állattenyésztés. 12. 4. 297-315.

Bencze A., Szabó F., Végh Gy. (1978). Szarvasmarhahizlalás karbamidhumát készítménnyel Vágóállat- és Hústermelés. 8. 5. 15-20.

Bocsor G. (1960). A magyar tarka marha Akadémia Kiadó, Budapest, 209.

Bozó S., Kovács I., Kollár N., Rada K.(1989). Állattenyésztés és Takarmányozás. 38. 8. 503-510.

Brown, A.H. Jr., Chewning, J.J., Johnson, Z.B., Loe, W.C., Brown C.J. (1991). Effects of 84-, 112- and 140-day postweaning feedlot performance tests for beef bulls. J. Anim. Sci., 69. 451-461.

Dalton, D.C. (1976). An analysis of Angus central bull performance tests in New Zealand. Proc. N. Z. SOC. Anim. Prod., 36. 210.

Dalton, D.C., Morris, C.A. (1978). A review of central performance testing of beef bulls and of recent research in New Zealand. Livest. Prod. Sci., 5. 147.

Dirk, D., Karin, N.,Gerd, N., Klaus, E. (2006). Carcass- and meat quality of pasture vs concentrate fed German Simmental and German Holstein bulls. Arch. Tierz., 49. 4. 315-328.

Dohy J., Keleméri G. (1971). Tej és hústermelésre ivadékvizsgált magyar tarka bikaállomány utódellenőrzési eredményeinek értékelése. Állattenyésztés. 20. 3. 227-231.

Füller I., Polgár J.P., Húth B., Hornyák Z., Lengyel Z. (2004). Magyartarka növendék bikák vágási adatainak értékelése. A magyartarka. 4. 3. 14-15.

Kralovánszky U.P., Kállai L., Szatmári N.J. (1957). Magyar tarka szarvasmarhák feljavító hízlalási adatainak elemzése. Állattenyésztés. 6. 1. 11-23.

Mészáros Gy.(1983). Hústermelő képesség vizsgálata és javításának lehetőségei szelekcióval hegyitarka állományokban. Kandidátusi értekezés. Budapest.

Morris, C.A. (1981). Herd effects on the growth of beef bulls from different sources tested together under grazing conditions. N.Z. J. Agric. Res., 24. ll.

Nagy N.(1982). Különböző genotípusú húsmarha STV-teljesítmények a testtömeggyarapodás és a takarmányhasznosítás függvényében. Állattenyésztés és Takarmányozás. 31. 6. 495-502.

Nagy N.,Tőzsér J., Szabó J. (1991). Adatok a húshasznú magyar tarka tenyészbika jelöltek teljesítményeinek és tenyészértékeinek megítéléséhez. Állattenyésztés és Takarmányozás. 40. 2. 109-123.

OMMI (2005). A szarvasmarhatenyésztés 2005. évi eredményei.

Polgár J.P. (1997). Magyar tarka és holstein-fríz tenyészbikajelöltek STV eredményeinek értékelése származási és ivadékvizsgálati adatokkal összefüggésben. Kandidátusi értekezés. 39.

Tong, A.K.W., Newman, J.A., Rahnefeld. G.W. (1986). Pretest herd effects on station performance test. Can. J. Anim. Sci., 66. 925.

Wolf Gy. (1978). Tenyészbikák hústermelő őrőkítőképességének megállapítása saját adataik és féltestvéreik vizsgálata alapján. Kandidátusi értekezés. Kaposvár.

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