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Young chinchillas weight gain, depending on their body mass at birth

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Abstract: *Young chinchillas weight gain, depending on their body mass at birth.* The aim of the study was to determine if the results of raising and growth for up to 4th months of age in chinchilla depends on body weight and the litter size at birth. There were also attempts to answer the question, when sexual dimorphism begins to be visible in young chinchillas. Males are heavier females from the first month of life in chinchilla, however up to the 4th months of age the differences are not statistically significant. During the study it was found, that young chinchillas mortality depends on their body weight at birth. When the body weight at birth is higher, the greater chances of survival of the young are. Number of puppies in the litter affects their body weight: the more young per litter are, the less average body weight is.

Key words: chinchillas, body gain, litter size

INTRODUCTION

One of the parameters to assess the reproductive performance of female mammals is the number of young born and weaned per year. The research carried out on pigs (Quiniou et al. 2002, Foxcroft et al. 2009;) shows that a large litter size reduces the average birth weight of young and increases the variability of birth weight in the litter. Body weight of piglets at birth is the primary factor for their survival, growth rate and body weight at weaning and significantly affects their subsequent fattening efficiency (Gondret et al. 2005; Rehfeldt and Kuhn 2006). Reaching high daily gains in fattening is only possible when achieved good growth already during the rearing period of piglets (Węckowicz and Haraśny 1992). Low body weight of piglets at birth is associated with an increasing number of piglets born dead and the increasing number of falls during the rearing period (Milligan et al. 2002a, b).

In breeding chinchillas also it comes to obtaining the largest possible number litters, and the largest possible number of young from the female during the year. A positive result is already two litters a year, although some authors point to a higher reproductive potential chinchillas. On the other hand, the excessive exploitation of females weakens their bodies and as a result may cause a reduction in fertility and shorten the length of the period of use (Barabasz 2001; Socha et al. 2001a; Socha et al. 2001b, Socha and Kasjaniuk 2003).

In fur animals especially important is the size of the skin, which is a determinant of its value. In studies carried out by different authors at finn racoons, foxes and mink shown that there is a positive correlation between the body weight and the size of the skin of animals (Gugołek et al. 2002).

Many studies have been carried out to take into account the indicators of fertility chinchillas depending on their age, color variety or a group of genetic origin (Socha and Wrona 2000a, b; Socha et al. 2003).

The aim of the study was to determine if the results of raising and growth for up to 4th months of age in chinchilla depends on body weight and the litter size at birth. There were also attempts to answer the question, when sexual dimorphism begins to be visible in young chinchillas.

MATERIAL AND METHODS

The studies were performed on a farm chinchillas in WULS-SGGW in 4 consecutive years. 98 litters (173 individuals) were rated together. The pups body weight measurements were performed once a week, starting from birth to 16th weeks of age (4 months). Chinchillas were kept in standard netting cages. The animals were fed pelleted feed ration (18.4% protein, 2.8% fat and 12% fiber) and hay *ad libitum*. The animals had continuous access to water.

The following parameters were calculated:
- the number of litters per female attributable to the year;
- the number of young born per litter;
- the average birth weight of pups;
- an overall mortality of pups.

Data analysis was performed by using one-way ANOVA and post hoc test and test NIR.

RESULTS AND DISCUSSION

Fertility rates and prolificacy of females in the experiment are shown in Table 1.

Fertility and prolificacy are the parameters defining the reproductive performance of females. Both genetic and environmental factors have an impact on the reproductive performance of females. Since many factors, particularly environmental ones may affect the farms breeding results. The average litter size in conducted throughout the period of 4-year studies were obtained at the level of 1.93 young. Literature sources indicate that chinchillas female in one litter give birth from 1 to 5 young, with an average litter size ranged from 1.79 to 2.15 (Socha et al. 2001a; Seremak 2007). Obtained in the study results are consistent with the literature cited.

Ratio of the average number of litters from female per year in the analyzed herd ranged from 1.31 to 1.63. The results are also similar to the literature data. Sulik and Barabasz (1995) received 1.21, Barabasz et al. (2000) reported 1.54–1.90 litters per female per year.

Percentage distribution of litter size is shown in Table 2.

TABLE 1. Reproductive parameters of chinchillas female

Parameters	1st observation year	2nd observation year	3th observation year	4th observation year	Average
Average number of pups in litter	1.88	1.87	2.13	1.81	1.93
Average number of litters per year	1.53	1.63	1.36	1.31	1.46

TABLE 2. Litter size, the percentage distribution and average body weight of born pups

Parameters	Litter size (number of pups)			
	1	2	3	4
Number of born pups	22	100	39	12
Share of in litter (%)	12.72	57.80	22.54	6.94
Average body weight at birth (g) ±SD	57.25 ±4.42	50.60 ±6.61	44.72 ±7.34	41.92 ±9.22

Most in terms of numbers were obtained from litters of young chinchillas double – 57.8%. Next were litters of three young constituting 22.54% and single – 12.72%. Received 12 chinchillas born in litters of 4 pups, which accounted for only 6.94%. By Neira et al. (1989), most chinchillas give birth to 1 young – 47.2%; 2 in the litter born 29.7%, 3 – 7.6% and 4 puppies – 0.6% of females.

The mean body weight for all litters of puppies at birth was 49.5 g. The highest average body weight at birth had a chinchilla from individual litters, and the lowest mass characterized by quadruplets.

The survival rate of young according to their birth weight are shown in Table 3.

Best results are obtained with birth weight above 60 g. Good results were obtained from rearing puppies from the group with birth weight 50–59 g and 40–49 g.

TABLE 3. Percentage of falls chinchillas pups depending on birth weight

Body weight at birth (g)	Share of in all falls (%)
30–39	47.40
40–49	23.20
50–59	19.30
Over 60	6.00

The overall mortality pups from birth to weaning was 19.52%, while in the first 2 weeks 17.9% of puppies have died. This is consistent with literature data. According to Jarosz and Rżewska (1996) and Seremak (2007), the first 2 weeks after birth are considered crucial to the survival of young chinchillas. This period is characterized by the highest mortality rate (around 20%), which may be due to low resistance and the absence of maternal milk.

Lower body weight of puppies at birth is correlated with high mortality: more susceptible to falls are lighter chinchillas.

Figure 1 shows the development of the body weight of young chinchillas from birth to 16th week of life, taking into account their body weight at birth. Puppies belonging to the lightest group (30–39 g) at the age of 4 months weighed an average of 362.8 g. Animals of the heaviest group (60–69 g at birth) in the same time weighed average until 480.2 g. Difference in body weight between individuals of the extreme groups was approximately 117.4 g. Pearson correlation coefficient calculated for birth weight and weight at week 16 was 0.496. It indicates, that the relationship exists: the heavier the newborns are, the heavier 4-month youth will be. The strength of this relationship, however, is average.

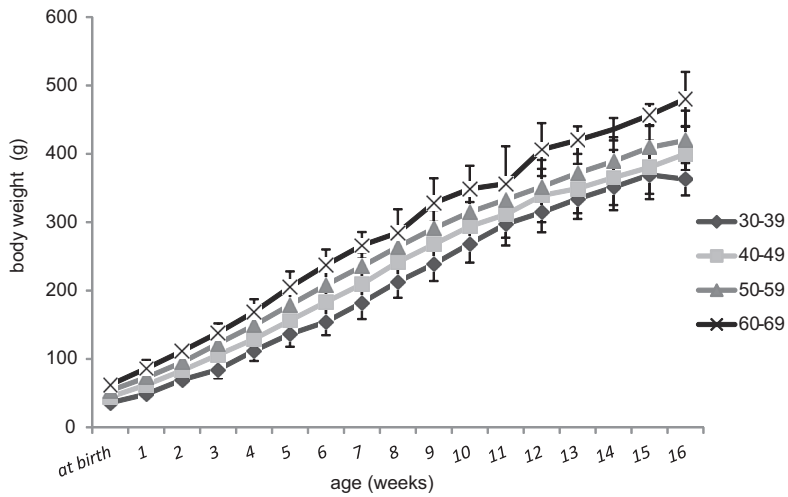

FIGURE 1. Changes in average body weight of chinchilla pups depending on body weight at birth

The analysis of young chinchillas changes in body weight with respect to gender are shown in Table 4.

TABLE 4. Changes in chinchillas body weight from birth to 16th weeks of age disaggregated by gender: x – mean, V – variability (%)

Age (weeks)	Average body weight (g)			
	male		female	
	x	V	x	V
At birth	50.30	16.20	48.58	15.52
1st	68.72	21.57	66.75	17.74
2nd	91.73	18.16	89.33	18.46
3th	114.75	18.48	111.40	20.25
4th	141.23	17.28	136.84	18.37
5th	170.21	15.96	166.26	18.05
6th	200.72	15.07	195.09	17.56
7th	228.18	13.82	219.70	15.07
8th	253.56	13.64	247.45	14.59
9th	282.67	12.47	276.44	14.02
10th	308.14	13.01	291.28	18.52
11th	328.87	13.40	316.54	11.90
12th	348.59	12.99	343.15	11.89
13th	362.37	12.67	353.18	11.19
14th	382.09	11.76	376.15	11.41
15th	401.57	9.88	392.84	10.05
16th	418.54	11.74	410.52	10.14

There was no observed gender impact on body weight (in any of the analyzed weeks, animals of different sexes did not differ statistically from each other).

In the literature there are reports (Jarosz and Rżewska 1996), that the male chinchilla are smaller than female. In this study the observed period to 4th months of age, females were characterized by lower body weight. Age of 4 months is the beginning of puberty chinchillas and this may have an impact on the subsequent differences in body weight between females and males. However, this requires further observations on a larger population of animals, but also in a longer period of time.

The relationship between litter size and the body weight of the animals are shown in Table 5.

Litters with one puppy characterized the highest body weight throughout the rearing period and the difference was highly significant compared with the other groups. Group of triplets characterized by a highly significant lower aver-

TABLE 5. Effect of chinchilla litter size on body weight from birth to 16th weeks of age

Age (weeks)	Litter size (number of pups)												P
	1			2			3			4			
	N	X	V	N	X	V	N	X	V	N	X	V	
At birth	22	57.25	7.73	100	50.60	13.06	39	44.72	16.42	12	41.92	21.99	<0.001
1st	21	79.00	15.92	85	69.25	17.36	36	58.81	21.64	8	64.75	16.38	<0.001
2nd	20	102.20	14.78	82	93.21	16.43	32	78.31	17.17	8	84.88	16.93	<0.001
3th	21	128.81	14.67	83	116.53	17.05	33	97.82	18.44	6	96.67	22.13	<0.001
4th	20	156.65	14.12	78	143.36	16.28	35	122.60	15.66	6	125.50	17.72	<0.001
5th	18	189.89	14.21	82	172.41	15.91	37	152.30	14.40	6	148.67	15.99	<0.001
6th	20	220.40	11.16	72	203.24	14.98	35	178.54	15.27	6	180.83	18.71	<0.001
7th	20	247.40	8.86	70	230.74	12.73	36	202.10	14.36	8	209.38	16.71	<0.001
8th	16	270.88	9.32	69	258.59	12.10	36	227.78	14.86	5	247.20	19.50	<0.001
9th	15	310.93	8.58	68	284.60	11.70	35	256.31	14.16	8	284.13	16.92	<0.001
10th	16	302.71	24.97	64	309.71	12.22	32	279.53	14.47	7	311.71	16.40	0.025
11th	14	343.07	9.96	53	330.09	11.92	23	300.43	11.66	5	305.80	10.69	0.003
12th	13	359.54	9.44	56	352.29	12.14	23	322.87	11.24	7	349.71	17.74	0.026
13th	11	392.09	7.13	52	360.67	12.01	23	344.09	10.59	5	325.20	17.19	0.005
14th	13	407.69	6.65	51	382.88	11.79	25	361.52	10.92	5	361.60	14.36	0.012
15th	12	421.75	6.71	44	402.84	9.52	17	377.18	9.87	3	347.33	3.17	<0.001
16th	10	434.70	6.11	41	418.83	10.78	17	391.06	10.00	4	429.75	20.06	0.064

N – number of litters; X – average body weight of one puppy (g); V – variability (%); P – statistical significance of the difference.

age body weight than the other groups of litters, also of quadruplets. It may result because of a small sample of quadruplets litters. Such results may also be affected by different numbers of individual in observed litters.

Barabasz and Łapiński (2008) in their study observed significant differences in body weight of pups from a single litters and "triplets" throughout the period of lactation (up to 5th weeks of age). Significant differences also occurred between puppies from litters of single and double in the first period of lactation. Differences decreased from the moment when pups have started to eat a pellets. The average body weight of pups from the "twins" were significantly higher than those of the triple in 14th, 21st and 28th days of age. The author suspects that it could be related to competition for nipple access.

CONCLUSIONS

1. Young chinchillas mortality depends on their body weight at birth. When the body weight at birth is higher, the greater chances of survival of the young are.
2. Birth weight determines the body weight of puppies chinchilla at the age of 4 months in the average degree.
3. Number of puppies in the litter affects their body weight. The more young per litter are, the less average body weight is.

4. Males are heavier females from the first month of life, but to the age 4 months the differences are not statistically significant.

REFERENCES

BARABASZ B., 2001: Szynszyle, hodowla i użytkowanie (Chinchillas – breeding and use). PWRiL, Warszawa (in Polish).

BARABASZ B., FORTUŃSKA D., BIENIEK J., 2000: Ocena intensywności użytkowania rozpłodowego samic szynszyli. Zesz. Nauk. AR Kraków 369(35): 121–133.

BARABASZ B., ŁAPIŃSKI S., 2008: Growth rate of sucking chinchilla pups and lactating performance of their dams. Anim. Sci. Pap. Rep. 26, 3: 227–234.

FOXCROFT G.R., DIXON W.T., DYCK M.K., NOVAK S., HARDIN G J.C.S., ALMEIDA F.C.R.L., 2009: Prenatal programming of postnatal development in the pig. In: Control of pig reproduction, VIII: 213–233.

GUGOŁEK A., LOREK M.O., ZABŁOCKA D., 2002: Studies on the relationship between the body weight, trunk length and pelt size in arctic foxes. Czech J. Anim. Sci. 47(8): 328–332.

GONDRET F., LEFAUCHEUR L., LOUVEAU I., LEBRET B., PICHOD O X., Le COZLER Y., 2005: Influence of piglet birth weight on postnatal growth performance, tissue lipogenic capacity and muscle histological traits at market weight. Livest. Prod. Sci. 93: 137–146.

JAROSZ S., RŻEWSKA E., 1996: Szynszyle, chów i hodowla. PWRiL, Warszawa.

MILLIGAN B.N., DEWEY C.E., De GRAU A.F., 2002a: Neonatal-piglet weight variation and its cycles and season of the year and its influence on fertility and litter weight. Ann. Anim. Sci., Suppl. 2/1: 107–111.

MILLIGAN B.N., FRASER D., KRAMER D.L., 2002b: Within-litter birth weight variation in the domestic pig and its relation to pre-weaning survival, weight gain, and variation in weaning weights. Livest. Prod. Sci. 76: 181–191.

NEIRA R., GARCIA X., SCHEN R., 1989: Reproduction and growth in confined chinchillas (*Chinchilla lanigera*). Avances en Production Animal, Chile 14 (1–2): 109–110.

QUINIOU N., DAGORN J., GAUDRE D. 2002: Variation of piglets' birth weight and consequences on subsequent performance. Livest. Prod. Sci. 78: 63–70.

REHFELDT C., KUHN G., 2006: Consequences of birth weight for postnatal growth performance and carcass quality in pigs as related to myogenesis. J. Anim. Sci. 84 (E. Suppl.): E113–E123.

SEREMAK B., 2007: Wybrane aspekty rozrodu szynszyli w chowie fermowym (Selected aspects of chinchilla (*Chinchilla laniger* M.) reproduction under farm management). Zeszyty Naukowe AR w Szczecinie, Rozprawy 240: 1–60 (Eng. Summary).

SOCHA S., JEŻEWSKA G., GONTARZ A., 2001a: Quantitative characterisation of chinchillas (*Chinchilla velligera* M.) litters. Deutsche Veterinärmedizinische Gesellschaft e.V. DVG, Arbeitstagung über Haltung und Krankheiten der Kaninchen Pelztiere und Heimtiere 9–10: 231–235.

SOCHA S, KASJANIUK M., 2003: Analiza czynników wpływających na plenność wybranych odmian barwnych szynszyli. Acta Sci. Pol. Pol., Zootechnica 2(2): 113–124.

SOCHA S., MAĆKOWIAK I., JEŻEWSKA G., GONTARZ A., DĄBROWSKA D., 2001b: Analiza plenności szynszyli (*Chinchilla velligera* M.) odmiany standardowej i beżowej polskiej w wybranych fermach. Zeszyty Naukowe Prz. Hod. 58: 39–46.

SOCHA S., WRONA A., 2000a: The analysis of the seasonal character of the chinchilla (*Chinchilla velligera* M.) reproduction. Procceedings of the VIIth International Scientific Congress in Fur animal Production, Kastoria. SCIENTIFUR 24, 4. Reproduction, III-A: 49–52.

SOCHA S., WRONA A., 2000b: Plenność samic szynszyli (*Chinchilla velligera* M.) należących do różnych grup genetycznych. Zeszyty Naukowe Prz. Hod. 53: 87–95.

SULIK M., BARABASZ B., 1995: Porównanie systemów utrzymania rozpłodowego na przykładzie wybranych ferm. Zesz. Nauk. AR w Krakowie 297: 159–165.

WĘCKOWICZ E., HARAŚNY Z., 1992: Badania rozwoju prosiąt. Prz. Hod. 8: 16–17.

Streszczenie: *Wpływ urodzeniowej masy ciała na wyniki odchowu szynszyli*. Celem badań było określenie, czy wyniki odchowu szynszyli do 4. miesiąca życia zależą od masy ciała i wielkości miotu przy urodzeniu. Spróbowano odpowiedzieć również na pytanie, w którym momencie rozwoju młodych zwierząt uwidacznia się dymorfizm płciowy. Od początku samce są cięższe od samic, lecz aż do 4. miesiąca życia różnica ta nie jest istotna statystycznie. Podczas badania stwierdzono zależność między urodzeniową masą ciała a śmiertelnością młodych. Większa masa ciała wpływa na większe szanse na przetrwanie. Liczba szczeniąt w miocie wpływa na ich wagę ciała: im więcej młodych, tym przeciętnie mają mniejszą masę ciała.

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