



Contributions to the study of the maternal features of the Bazna breed sows, raised and maintained as genetic stock at S.C.A. Turda (Cluj, Romania)

¹Mircea Rusu, ²Miklos Botha, ²Claudiu Gavriloaie, ^{2,3,4}I. Valentin Petrescu-Mag

¹ Samus Special Technologic Highschool, Cluj-Napoca, Romania; ² Bioflux SRL, Cluj-Napoca, Romania; ³ Department of Environment and Plant Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania; ⁴ University of Oradea, Oradea, Romania. Corresponding author: I. V. Petrescu-Mag, zoobiomag2004@yahoo.com

Abstract. This study was planned to investigate the maternal features of the Bazna breed sows. The research has taken place within S.C.A. Turda (Cluj, Romania), on a group of young Bazna breed sows which descended from the breeding stock started in 1968 through the transfer from S.C.Z. Jucu (Cluj, Romania). The genetic material consisted in Bazna breed females, more precisely a batch of 25 primiparous sows and 50 multiparous sows. According to our study, most of the investigated maternal behavioral sequences proved to be hereditary and therefore the knowledge of sows' behavior gives the specialists the chance to improve the pig breeding technology by creating a balance between the environmental conditions and the farm conditions.

Key Words: behavior, maternal features, Bazna sows, rare breeds, reproduction.

Introduction. Although they are not always highly productive, rustic breeds have a special place in the modern practices of animal breeding (Şuteu 2011; Ichim 2012; Oroian & Petrescu-Mag 2014; Botha et al 2014).

The Bazna breed was formed after unassisted cross-breeding between the Mangalitsa breed sows and boars from Berk breed, beginning with the year 1872, in Bazna town from Transylvania, also using consanguinity. The resulted hybrids, having superior productive features to the breed Mangalitsa, were valued by the farmers, so that the hybrid population spread shortly after, around the towns Mediaş, Sighișoara, Sibiu and Făgăraş, because of early maturity and superior fertility features of Bazna breed compared to those of Mangalitsa and Stocli breeds. After the Second World War, Bazna breed spread in other areas of Transylvania as well (in counties such as: Cluj, Alba, Hunedoara, Mureş, and Harghita), particularly in the hill and mountain areas, but also in Banat region, due to some human population movements in this area (wikipedia.org; Botha et al 2016; Draganescu et al 2008).

Material and Method. The study has taken place within S.C.A. Turda (Cluj, Romania), on a group of young Bazna breed sows which descended from the breeding stock started in 1968 through the transfer from S.C.Z. Jucu (Cluj, Romania). The area is characterized by continental hill climate; the annual average temperature is 8.8°C; the absolute average temperature, registered in February 1957, is +30.5°C; the absolute maximum temperature, registered in August 1946, is +38.5°C; the monthly average temperature amplitude is +23.7°C. The farm work is carried out in a semi-intensive system; the farm is part of the category of farms with managerial skills (in order to get closer to the

exploitation conditions, to the conditions in households, where the two breeds Bazna and Mangalitsa are to be found). The stalls for the males and females accommodation, in preparation for mating, are found in the same shelter, being provided with enclosure. The micro climate is being ensured by exclusively natural resources, having the following parameters: +15°C optimum temperature of the shelter, the relative humidity of the air $U = 65-75\%$.

The genetic material consisted in Bazna breed females, more precisely a batch of 25 primiparous sows, and 50 multiparous sows.

For the investigation of the maternal behavior of sows belonging to the Bazna breed established methods for research were used: the chronometric method (tracking behavior by continuous surveillance 24 hours of 24), the free-observation method and the weighing method for the stock of piglets taken in the study.

Results and Discussion. We observed the antepartum behavioral sequences, taking in consideration the parturition initiation process (Figure 1). Also behavior during parturition, and postpartum was observed in Bazna sows.

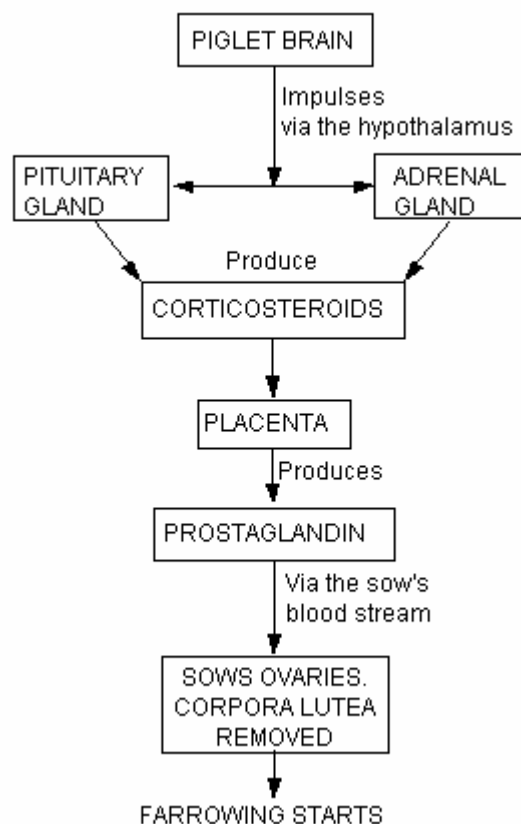


Figure 1. The initiation pattern of parturition (source: <http://www.thepigsite.com/pighealth/article/220/parturition-farrowing/>).

Antepartum maternal behavior

Antepartum behavior of rest and agitation. As the moment of delivery is getting closer, sows become calmer, and rest time is extended, there is an acceleration of the cardio-respiratory rhythm, hyperthermia, and their skin becomes dry. During the last two days before parturition, sows lay down, they rest or even sleep. The increase in the length of time for rest is determined by getting nearer to the moment of delivery, as well as by the increase in the body mass. Transferred from the area of gestation to the maternity area (taking them in stalls for delivery), the sows become restless, anxious, interested in investigating the conditions of accommodation. Analyzing the daily rest before delivery on sows, on a length of time of 12 hours, one notices that the time allocated for this

activity is of 523 minutes (8 hours and 43 minutes) with very large individual variations ranging between 160 minutes (2 hours and 40 minutes) and 658 minutes (10 hours and 58 minutes; see Table 1).

Table 1

Antepartum rest in sows

Specification	M.U.	Values	Tier parturition [†]		
			I	II	III and up
Average value	Minutes	523.33	466	494	610
	%	100	89.1	94.4	116.6
Top	Minutes	658	586	516	658
Minimum	Minutes	160	160	211	467

M.U. – measurement unit, † - I: primiparous, II and III: multiparous. Note: the average value is considered as 100%.

The average time for daily rest before delivery is variable and depends on the rank of the delivery, being shorter for the primiparous and longer for the multiparous.

Analyzing the average time of antepartum agitation for a period of 12 hours, it has been found that this has a variable duration, being opposite to the resting time, having an average length of 69 minutes (1 hour and 9 minutes; see Table 2).

Table 2

Antepartum agitation in sows

Specification	M.U.	Values	Tier parturition [†]		
			I	II	III and up
Average value	Minutes	72	106	67	43
	%	100	153.60	97.10	62.30
Top	Minutes	226	226	178	133
Minimum	Minutes	5	25	20	5

M.U. – measurement unit, † - I: primiparous, II and III: multiparous. Note: the average value is considered as 100%.

Antepartum behavior of drinking. Antepartum, generally, the sow's appetite is diminished, some authors considering it moody; therefore, because of this, feeding the sows in this period will be restricted by a special program. Analyzing the frequency of drinking water, one may notice a reduction in their frequency from 10.55 at primiparous, to an average of 7.70 recorded at multiparous (which has been explained on one hand by a greater tranquility manifested by the last ones and, on the other hand, by the increasing of the digestive tube capacity, along with the increasing body weight specific to multiparous; see Table 3).

Table 3

Antepartum behavior of water drinking

Specification	M.U.	Values	Tier parturition [†]		
			I	II	III and up
Average value	Times	9.31	10.55	9.70	7.70
	%	100	112.90	104.30	82.79
Top	Times	3.3	226	178	133
	%	100	109.09	100	87.87
Minimum	Times	50	6	5.20	4.20
	%	100	120	104	84

M.U. – measurement unit, † - I: primiparous, II and III: multiparous. Note: the average value is considered as 100%.

Sows behavior during parturition. During the process of improvement of the pigs, in their natural conduct there may occur behavior changes which influence the sows behavior during parturition. For this purpose, the following aspects were studied: the average length of time for parturition in 24 hours time, but also the recording of the time lapse with the highest frequency in farrowing, the piglets weight depending on their expulsion order, the state of piglets during their birth, sows and piglets behavior during the first 3 weeks after parturition.

We mention that these investigations have been carried out on a batch of 50 primiparous and multiparous sows, taking into account the parturition I, II, III, but also above this number, as well as the number of born piglets. From the presented information it results the fact that the length of time when parturition increases in parallel with the number of piglets which have been born, from 2 hours and 30 minutes at the primipares having farrowed between 5 and 7 piglets, to nearly 4 hours at the multiparous having farrowed over 11 piglets (Table 4).

From the studied cases it results a high variability of the parturition length of time, due to a large number of complex factors, out of which we may mention the stress caused by the noise from the shelter, the handling of the feeding, the changing of the caretakers, or operations carried out by everyday routine (the cutting of the teeth, the managing of drugs, for example iron based products, etc) or even because of delivery assistance by persons unknown to the sow.

Table 4

The parturition process range at sows according to different authors (data from Dinu et al 1990; Spadaru 1997, 1998)

Reference	M.U.	Tier parturition [†]		
		I	II	III and up
Dinu (1973)		4-6	1	12
Dinu (1978)		2	1	3
Gligor et al (1969)	hours	3-4	1/2	14
Redechin (1946)		2-4	-	12
Dinu et al (1978)		2-3	3/4	13-14

M.U. – measurement unit, † - I: primiparous, II and III: multiparous.

The state of piglets while being born. By analyzing a number of 15 deliveries, it was noticed that out of the total number of the farrowed piglets, 70.25% was born through head first presentation and only 29.75% was delivered backward (Table 5).

Table 5

The state of piglets while being born

Sexes	Total		Head first presentation		Backward presentation	
	Individuals	%	Individuals	%	Individuals	%
Total	158	100	111	70.25	47	29.75
Males	85	100	61	71.76	24	28.24
Femele	73	100	50	68.49	23	31.51

If the parturition process encountering difficulties by stopping the delivery, mechanical human interventions (if oxitocyn administration can be avoided) can be taken into account, but only by qualified personnel, which are aware of the sow reproductive tract anatomy (Figure 2).

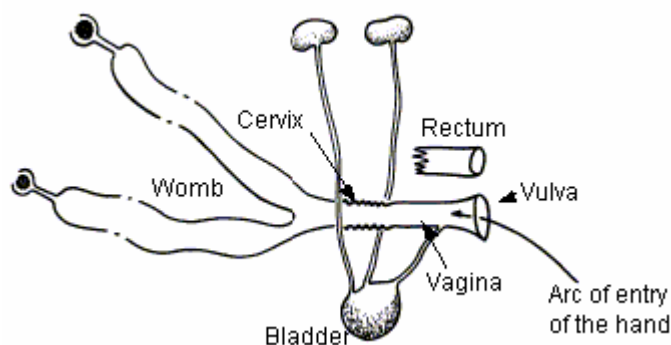


Figure 2. Anatomy of the sows reproductive tract, showing also the bladder and kidneys (source: <http://www.thepigsite.com/pighealth/article/220/parturition-farrowing/>).

Piglets distribution by sexes. As we can see in the analysis of the data from the total experimental out of the total number of piglets obtained from the 15 deliveries, 53.80% are male and 46.20% are female (Table 6).

Table 6

Distribution of piglets by sexes

Total piglets obtained	M.U.	Of which	
		Males	Females
158	Individuals	85	73
100	%	53.80	46.20

M.U. – measurement unit.

Piglets weight according to the expulsion order. The body weight of the newly born piglets in a farrowing batch fluctuates from one piglet to another (Table 7). There is a tight correlation between the size of the piglets and the duration of their expulsion. Between the body weight and the percentage of the piglets survival there is a close interdependence.

The greatest losses will be recorded during the first few days of life, around 78.55% of the total piglets lost in the maternity, and for this reason we recommend, once again, a particular attention for the delivery assistance. The first piglets, more vigorous and more viable, have a bigger body weight than the last ones. Some authors, but also our investigations show that piglets are usually born miscellaneous, the last piglets having the biggest weight.

Table 7

The weight of piglets in the farrowing expulsion order (primiparous sows)

Crt no.	M.U.	Expulsion order							
		1	2	3	4	5	6	7	8
1		770	800	880	640	900	955	1,000	1,200
2		875	670	900	960	980	800	1,040	1,110
3		650	640	700	820	950	1,000	1,000	1,040
4	g	670	900	1,040	1,200	1,000	1,065	900	1,000
5		900	840	1,050	900	970	800	890	900
Average		759	770	914	906	980	923	966	1,048

M.U. – measurement unit.

One may notice that the piglets born by primiparous females have had lesser body weight than the ones born by multiparous females (Table 8).

Table 8

The weight of piglets in the farrowing expulsion order (multiparous sows)

Crt no.	M.U.	Expulsion order							
		1	2	3	4	5	6	7	8
1		1,240	800	980	1,120	1,160	1,500	1,480	1,500
2		1,220	1,300	820	1,000	1,200	1,200	1,260	1,360
3		1,100	1,220	960	1,400	1,060	110	1,385	1,225
4	g	1,260	1,240	1,110	1,255	1,100	1,330	1,195	1,285
5		1,510	1,780	1,380	1,665	1,440	1,600	1,640	1,680
Average		1,262	1,268	1,050	1,288	1,108	1,358	1,392	1,410

M.U. – measurement unit.

Postpartum maternal behavior. A large part of the zoo-economical features of the animals are externalised by their behavior, and most behaviors are hereditary. One has noticed the sows behavior in the first three weeks of breastfeeding. With respect to the sows behavior in the first three weeks of lactation, one has noticed that the time of breastfeeding decreases from 198 minutes, during the first week, to 108 minutes in the third week, as long as the time of feeding the sow increases from 122 minutes during the first week to 160 minutes towards the end of the range of the study (Table 9). This tendency is noted as well in the case of the time given by the sow to motion, this increases from 27 minutes, during the first week of lactation, to 46 minutes in the third week of lactation. The time for resting remains relatively constant during the first three weeks of lactation, one noticing a slight increase of it, especially in the third week, which can be explained by the fact that, during this period, the piglets are given an additional foraging (so that they require less breastfeeding from the sow). Motion, other than that carried out for foraging, will be limited to a very short period of time, which will represent 1% of the total of the activities over a period of 24 hours.

Table 9

The behavior of sows in the first three weeks after lactation

Specification	M.U.	Limits	X	SEM
<i>First lactation week</i>				
Recreation		900-1,130	1,099	3.30
Motion	Minutes/day	15-65	27	2.10
Lactation		180-225	198	1.87
Feeding		92-140	122	3.16
<i>Second lactation week</i>				
Recreation		1,101	1,108	3.04
Motion	Minutes/day	9-51	25	2.42
Lactation		130-184	164	3.16
Feeding		100-210	146	3.64
<i>Third lactation week</i>				
Recreation		1,137-1,308	1,163	4.82
Motion	Minutes/day	15-99	46	1.55
Lactation		75-120	108	1.28
Feeding		110-220	160	3.16

M.U. – measurement unit, X – average, SEM – standard error of mean.

Conclusions. Most behavioral sequences are hereditary transmitted. Knowledge of sows behavior allows the specialists the chance to improve the growth and exploitation technology by creating a balance between the environmental conditions and the farm conditions. This is the only cost effective and animal welfare approach in order to exteriorize the maximum genetic potential of each individual.

References

- Botha M., Oroian I. G., Petrescu-Mag I. V., Gavriiloaie C., 2014 Mangalitsa: the recovery of a rustic genetic heritage. *Porc Res* 4(2):30-36.
- Botha M., Petrescu-Mag I. V., Gavriiloaie C., 2016 Rustic gene reserves for the future of breed improvement technologies: old swine (*Sus scrofa domesticus*) strains and their perspectives. *Porc Res* 6(2):37-56.
- Dinu I., Farkas N., Halmagean P., Simionescu D., 1990 Tehnologia cresterii suinelor. Editura Didactica si Pedagogica, Bucuresti.
- Draganescu C., Ghita E., Nagy A., 2008 Note on the genetic history of the Romanian Saddleback (Bazna) pig breed conservation nucleus. *Archiva Zootechnica* 11(2):65-69.
- Ichim O., 2012 An overview of organic pig farming in Romania. *Porc Res* 2(2):50-65.
- Oroian I. G., Petrescu-Mag I. V., 2014 Mangalitsa breed returns to homeland. *Porc Res* 4(1):19-21.
- Spadaru F., 1998 Aspecte practice ale cresterii porcinelor. Volum I, Editura Promedia Plus, Cluj-Napoca.
- Spadaru F., 1997 Tehnologia cresterii si exploatarii suinelor. Tipo Agronomia, Cluj-Napoca.
- Şuteu M., 2011 Porcine milk protein polymorphisms. *Porc Res* 1(1):1-112.
- *** https://ro.wikipedia.org/wiki/Porc_de_Bazna [Last view, September, 2016]
- *** <http://www.thepigsite.com/pighealth/article/220/parturition-farrowing/>

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Authors:

Mircea Rusu, Samus Special Technologic Highschool, Romania, Cluj, Cluj-Napoca 400572, 51 Fabricii de Zahar Street, e-mail: profesorbio72@yahoo.com

Miklos Botha, Bioflux SRL, Romania, Cluj, Cluj-Napoca 400488, 54 Ceahlău Street, e-mail: miklosbotha@yahoo.com

Ioan Valentin Petrescu-Mag, University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture, Department of Environment and Plant Protection, Romania, Cluj, Cluj-Napoca 400372, 3-5 Calea Mănăştur Street, e-mail: zoobiomag2004@yahoo.com

Claudiu Gavriiloaie, Bioflux SRL, Romania, Cluj, Cluj-Napoca 400488, 54 Ceahlău Street, e-mail: ionelclaudiu@yahoo.com

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