Lucrări ştiinţifice **Zootehnie şi Biotehnologii**, vol. **41 (2)** (**2008**), Timişoara

RESEARCHES REGARDING PIGLET THERMOREGULATION

CERCETĂRI PRIVIND TERMOREGLAREA LA PURCEII SUGARI

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The aim of the research was to record body thermoregulation in piglet function of glycaemia, quantified by body weight at weaning. In order to a quick body thermoregulation of piglets after parturition Mistral and Mistral + Dexamethasone products were used. After their use a quicker dry is recorded in piglets (1 – 2 minutes), a slighter decrease in the body temperature, a smaller energy consumption, needed in thermoregulation, correlated to a higher glycaemia and stronger outlets, capable of colostrum consumption, and as a result, higher body mass at weaning.

Key words: glycaemia, metabolic, parturition, thermoregulation

Introduction

The period between delivery and weaning is very important in swine husbandry, the profit depending in a great measure on the number of piglets weaned and raised.

The maintenance of heat balance at delivery is vital in piglets, with the implication of a proper heat genesys. The capacity of piglets to produce heat as a response to the action of cold is well developed at parturition, the metabolic rate of suckling pigs is higher with 30% at 18^{o}C than 31^{o}C, but only in those 30 minutes after parturition.

The new born piglets suffer of strong stress due to cold when the environment temperature is under the critical level of 32 - 34 ^{o}C.

The energy reserves of piglets at parturition are low compared to their necessary in this period. In these conditions, the early feeding with colostrum and the maintenance of a proper temperature are vital for their survival.

Material and Methods

The research was made on 12 females F_1, at their first parturition, from Landrace and Large White races, pregnant with Duroc males. For being able to observe the piglet batches until weaning, they were individualised by ear marking and weighed when delivered and weaned. They rectal temperature was constantly measured during the first 48 hours and their blood sugar was measured at 1, 12 and 24 hours after parturition.

For a quicker drying for their comfort in the first hour after delivery (avoiding hypothermia, ombilical, joint and belly button infections), Mistral and Mistral + Dexamethasone products were used. Mistral was powdered onto the piglets, a natural non-irritating product for the sensitive new born skin. Dexamethasone was intramuscular injected 0.1 mg/piglet, having a stabilising role for the cell membranes, correcting the tendency of tissues to rapidly burn glucose and increasing the liver glycogen and glycaemia.

To compare the results also control batches were used for the two female categories at their first and third parturition.

Results and Discussions

For the piglets that were not treated with Mistral (control group) the drying of the body surface was made in 10-15 minutes after parturition and it was recorded the decrease of the internal temperature with 1.1^{o}C in the first hour, the smallest value – of 36 ,9^{o}C was recorded in the piglet with the smallest body weight: 0,920 kg. At 24 hours after parturition an increase of 0.5^{o}C is recorded in the piglets with a body weight over 1.5 kg, and for those under this value, the temperature drops or remains constant. At 12 hours after parturition the glycaemia value increases from 49 – 56 mg/ml to 91 – 105 mg/ml, excepting the piglet with 0,920 kg (glycaemia 65 mg/ml), while at 24 hours, the glycaemia is between 105 – 111 mg/ml.

For the piglets treated with Mistral, the body surface drying is made in 1 – 2 minutes after parturition, the decrease of internal temperature at 1 hour after parturition is situated between 0,5 – 0,8^{o}C, the smallest value being of 37,8^{o}C, but not in the piglet with the smalest body weight. At 24 hours after parturition the temperature remains relatively constant: 37,8 – 38,6^{o}C. Glycaemia at parturition is situated between 54 – 57 mg/ml, with the smallest value in the piglet with the smallest weight. At 12 hours after parturition glycaemia is between 101 – 106 mg/ml, and at 24 hours 114 – 118 mg/ml. (tabel 2).

Tabel 1 The evolution of temperature and glycaemia in piglets from females at their first delivery (control group)

No. of piglets	Weight at delivery (kg)	Temperature (°C)						Glycaemia (mg/ml)			Weight at weaning (kg)
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 033-106											
1.	1.820	37.9	38.1	37.6	37.5	37.8	38.2	54	103	109	8.840
2.	1.500	38.0	38.3	37.9	37.6	38.0	38.3	-	-	-	8.480
3.	1.360	37.4	37.8	37.5	37.8	37.9	38.2	-	-	-	7.900
4.	1.880	37.6	37.5	37.3	37.1	37.4	37.9	-	-	-	8.640
5.	1.800	37.4	37.6	37.5	37.2	37.6	38.0	-	-	-	9.200
6.	0.980	37.3	36.9	37.1	36.7	37.1	36.2	51	91	92	-
7.	1.860	37.5	37.7	37.4	37.0	37.5	37.9	-	-	-	8.700
8.	1.680	37.6	37.8	37.4	37.2	37.4	37.8	-	-	-	9.040
9.	1.440	37.5	37.5	37.3	37.5	37.9	38.2	55	105	114	8.420
10.	1.400	37.2	38.0	37.5	37.4	37.7	37.9	-	-	-	8.300
11.	1.060	37.2	37.4	37.1	36.9	36.6	37.2	49	79	90	-
12.	1.780	37.6	37.9	37.7	37.3	37.6	38.1	-	-	-	8.680
Nr. matricol 033-078											
1.	1.680	37.4	38.0	37.5	37.7	38.2	37.8	-	-	-	8.260
2.	1.720	38.0	37.6	38.3	37.5	37.8	38.2	-	-	-	8.320
3.	2.220	37.6	37.5	37.6	37.3	37.9	38.5	56	105	109	9.180
4.	1.600	37.7	37.4	37.1	37.4	37.6	37.9	-	-	-	8.500
5.	1.890	37.8	37.5	37.7	37.9	38.4	38.4	-	-	-	9.040
6.	1.440	37.4	37.2	37.4	37.2	37.6	37.8	-	-	-	8.860
7.	1.500	37.5	37.5	37.2	36.9	37.5	37.8	53	91	111	8.460
8.	1.800	37.8	37.4	37.5	37.7	37.4	38.0	-	-	-	8.360
9.	1.400	37.3	37.2	37.5	37.2	36.8	37.5	-	-	-	-
10.	1.880	37.6	37.5	37.1	37.5	37.0	37.7	-	-	-	8.400
11.	1.640	37.5	37.7	37.3	37.0	37.7	37.4	-	-	-	8.940
12.	0.920	36.9	36.6	36.1	34.6	-	-	49	65	-	-
13.	1.540	37.6	37.1	37.3	37.5	37.8	38.2	-	-	-	8.280
14.	1.260	37.2	37.0	36.8	37.4	37.1	37.8	51	97	105	7.400

Analysing the data in tabel 3 for the piglets treated with Mistral and Dexamethasone, a decrease of body temperature at 1 hour after parturition is recorded, of 0,5 – 1,8°C with the smallest value of 37,4°C correlated with the smallest body weight. At 24 hours after parturition the temperature varies between 37,5 – 38,5°C, and at 48 hours 37,6 – 38,6 °C. At parturition the glycaemia values are 52 - 64 mg/ml and 114 - 122mg/ml at 24 hours from delivery.

For F_1 female piglets, at their third delivery, not treated with Mistral (control group) a body surface drying is recorded at 10 – 15 minutes after parturition. The decrease of internal body temperature at 1 hour after delivery with 1,5 – 1,8°C and the maintenance of these values in the first day, the smallest value of 36,7°C is recorded with the smallest body weight - 1,140 kg, at 6 hours after parturition.Glycaemia at parturition is situated between 50 – 57 mg/ml, the smallest value being recorded in piglets with a body mass of 1,640 kg and 1,680 kg, 50mg/ml.

Tabel 2 The evolution of temperature and glycaemia in piglets from females at their first delivery. treated with Mistral

Nr. of piglets	Mass at parturition (kg)	Temperature (°C)						Glycaemia (mg/ml)			Mass at weaning (kg)
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 033-199											
1.	1.960	38.3	38.4	38.1	37.8	38.4	38.5	55	102	116	9.080
2.	2.180	38.4	38.2	37.8	38.2	38.6	38.4	-	-	-	8.940
3.	1.640	37.9	38.1	37.7	37.4	37.6	38.2	-	-	-	8.380
4.	1.840	38.0	38.2	37.9	37.5	38.2	38.6	57	101	118	8.560
5.	1.720	38.1	37.9	37.6	37.9	38.4	38.5	-	-	-	8.400
6.	1.540	37.8	38.1	38.2	38.0	38.2	38.6	-	-	-	8.800
7.	1.700	37.8	38.2	37.6	37.7	37.9	38.1	-	-	-	9.180
8.	1.440	38.0	37.8	37.5	37.6	37.8	38.2	54	106	114	8.560
Nr. matricol 033-014											
1.	2.140	38.3	38.5	38.1	37.9	38.2	38.5	56	110	114	9.080
2.	1.660	37.9	38.3	38.0	38.2	38.5	38.4	-	-	-	8.820
3.	1.640	38.0	38.3	37.9	37.6	37.9	38.6	-	-	-	8.780
4.	1.540	38.1	37.9	38.3	38.0	37.7	38.3	52	103	112	8.660
5.	1.980	38.0	38.2	37.8	37.6	38.0	38.2	-	-	-	8.580
6.	1.480	37.8	38.3	37.7	38.2	38.4	38.3	-	-	-	8.300
7.	1.760	37.6	37.9	38.0	37.5	37.8	38.2	-	-	-	8.540
8.	2.060	38.2	38.0	37.8	37.6	38.1	38.5	58	104	113	8.900
9.	1.680	37.9	38.2	37.9	37.5	37.6	37.9	-	-	-	8.460
10.	1.600	37.6	37.8	38.2	38.0	38.3	38.4	-	-	-	8.540
11.	1.620	37.8	38.0	37.7	37.5	37.9	38.2	54	106	112	8.460

Tabel 3 The evolution of temperature and glycaemia in piglets from females at their first delivery. treated with Mistral and Dexamethasone

Nr. of piglets	Mass at parturition (kg)	Temperature (°C)						Glycaemia (mg/ml)			Mass at weaning (kg)
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 033-065											
1.	1.640	38.1	38.0	37.6	37.9	38.4	38.6	-	-	-	8.960
2.	1.660	37.9	37.8	37.5	37.8	38.0	38.4	63	108	118	9.300
3.	1.480	37.8	37.8	37.4	37.8	37.5	37.9	-	-	-	8.920
4.	1.600	37.9	37.9	38.2	37.7	37.9	38.4	-	-	-	9.200
5.	1.360	37.4	37.7	37.9	37.5	37.7	37.9	-	-	-	8.520
6.	1.420	38.0	37.9	37.4	37.6	37.9	38.3	-	-	-	8.740
7.	1.700	38.4	38.0	38.6	38.2	38.5	38.1	64	103	115	9.280
8.	1.420	37.7	37.8	37.5	37.9	37.6	38.0	-	-	-	8.700
9.	1.160	37.4	37.5	37.1	37.5	37.8	37.6	-	-	-	8.240
10.	1.680	37.7	37.8	37.4	37.6	38.0	38.3	56	104	114	9.200
11.	1.460	37.6	37.9	37.5	37.3	37.9	38.4	-	-	-	8.760

Nr. matricol 033-155											
1.	1.100	37.8	37.5	37.7	38.0	37.6	38.2	57	102	117	8.240
2.	1.620	38.0	38.3	38.0	37.7	38.4	38.5	-	-	-	8.920
3.	1.580	37.7	38.0	37.6	38.1	38.5	38.0	-	-	-	8.740
4.	1.060	37.9	37.6	37.3	37.7	38.0	37.6	52	99	114	8.320
5.	1.760	38.2	38.3	37.9	38.3	38.6	38.3	-	-	-	9.120
6.	1.460	38.0	37.7	37.4	37.8	37.5	38.4	-	-	-	8.900
7.	1.820	38.2	38.5	38.1	38.6	38.3	38.0	59	104	122	9.200
8.	1.980	38.3	38.0	37.6	38.2	38.6	38.5	-	-	-	9.080
9.	1.380	37.8	38.1	37.5	37.9	37.6	38.1	-	-	-	8.800
10.	1.480	38.0	37.6	37.4	38.0	38.4	37.9	-	-	-	8.640
11.	0.780	37.5	37.3	37.0	37.4	37.9	37.7	54	91	109	-
12.	0.880	37.8	37.5	37.7	38.1	37.0	37.6	-	-	-	7.420

Tabel 4 The evolution of temperature and glycaemia in piglets from females at their third delivery (control group)

Nr. of piglets	**Mass at delivery (kg)**	**Temperature (^oC)**						**Glycaemia (mg/ml)**			**Mass at weaning (kg)**
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 009-073											
1.	1.940	37.4	37.5	37.2	37.4	37.8	38.2	-	-	-	8.620
2.	1.680	37.5	37.4	37.5	37.2	37.5	37.9	-	-	-	8.328
3.	2.060	37.8	37.6	37.2	37.0	37.6	38.3	54	101	108	9.140
4.	1.560	37.7	37.5	37.0	37.4	37.3	37.6	-	-	-	8.400
5.	1.340	37.4	36.8	37.1	37.3	37.2	37.9	-	-	-	8.260
6.	1.620	37.3	37.3	36.8	37.2	37.7	38.0	-	-	-	8.600
7.	1.820	37.4	37.0	37.2	37.3	37.8	37.5	51	98	107	8.240
8.	1.400	37.2	37.2	36.9	37.3	37.6	37.9	-	-	-	8.500
9.	1.320	37.5	37.6	37.3	37.1	37.5	37.8	-	-	-	8.480
10.	1.280	37.6	37.1	37.4	37.0	37.6	38.1	-	-	-	7.880
11.	1.640	37.4	37.4	37.2	36.8	37.2	37.6	50	92	104	8.560
12.	1.700	37.8	37.3	36.9	37.2	37.6	37.7	-	-	-	8.300
13.	1.420	37.6	37.4	37.0	37.4	37.6	37.5	-	-	-	8.240
14.	1.140	37.2	36.9	36.7	37.0	37.5	37.9	54	96	106	8.220
Nr. matricol 009-056											
1.	1.640	37.2	37.6	37.3	37.5	37.7	37.8	-	-	-	8.400
2.	1.480	37.5	37.4	37.0	37.3	37.6	38.1	55	95	106	8.540
3.	1.980	38.0	37.6	37.2	37.0	37.7	38.2	-	-	-	8.440
4.	1.340	37.7	38.1	37.8	37.4	37.6	37.7	-	-	-	8.120
5.	1.580	37.3	37.5	37.7	37.3	37.0	38.0	-	-	-	8.300
6.	2.020	37.6	37.7	37.3	37.6	37.5	38.2	57	104	112	8.900
7.	1.200	37.6	37.2	36.8	37.0	37.3	37.9	-	-	-	8.080
8.	1.040	37.5	37.0	36.5	36.8	37.2	37.5	-	-	-	7.920
9.	1.680	37.0	37.2	36.8	37.2	37.0	37.4	50	101	108	8.400
10.	1.890	37.5	37.4	37.0	36.7	37.1	37.8	-	-	-	8.240
11.	1.460	37.6	37.2	36.9	37.3	37.0	37.5	-	-	-	0.480
12.	1.320	37.4	37.3	37.0	36.7	37.2	37.7	-	-	-	8.500
13.	1.460	37.7	36.9	36.5	36.9	36.8	37.2	52	97	104	8.680

At 48 hours after parturition the temperature is situated between 37,2 – 38,3^{o}C, the smallest values being recorded in the piglets with the smallest body weight. At 48 hours the temperature is 37,9 – 38,2^{o}C, and the glycaemia at

parturition 50 – 57 mg/ml with the smallest value in the smallest pig – that with 1,640 kg and the temperature of 37,2°C. At 12 hours the glycaemia increases to 92 – 104 mg/ml, and the glycaemia to 104 – 112 mg/ml, the highest value being recorded in the piglet with the highest body weight at parturition (2,020 kg).

Tabel 5 The evolution of temperature and glycaemia for the piglets from females at their third parturition, Mistral treated

Nr. of piglets	Mass at parturition (kg)	Temperature (°C)						Glycaemia (mg/ml)			Mass at weaning (kg)
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 009-025											
1.	1.560	38.0	38.4	38.2	37.7	38.1	38.7	63	107	115	9.060
2.	1.540	38.2	38.5	38.3	38.7	37.9	38.5	-	-	-	8.820
3.	1.180	37.7	38.7	37.9	37.9	38.3	37.9	-	-	-	8.500
4.	1.480	37.9	38.4	37.7	37.7	38.0	38.4	-	-	-	8.780
5.	0.820	37.5	36.9	37.2	37.2	36.2	-	58	60		-
6.	1.550	37.8	38.6	38.1	38.1	38.2	38.6	-	-	-	8.680
7.	1.560	37.9	38.3	38.2	38.2	38.5	38.8	-	-	-	8.800
8.	1.600	37.9	38.4	38.5	38.5	38.9	38.6	-	-	-	9.120
9.	1.740	38.2	37.9	38.7	38.7	38.5	38.8	61	103	114	9.300
10.	1.540	37.9	37.9	38.1	38.1	38.1	38.5	-	-	-	8.980
11.	1.580	38.1	38.6	38.3	38.3	37.9	38.4	-	-	-	8.800
12.	1.480	37.7	37.5	37.9	37.9	38.3	38.5	-	-	-	8.860
13.	1.380	37.8	38.1	38.1	38.1	38.0	38.6	60	105	118	8.760
14.	1.540	37.7	38.2	38.3	38.3	38.4	38.1	-	-	-	8.600
Nr. matricol 009-063											
1.	1.680	38.2	38.6	38.3	38.1	38.3	38.6	-	-	-	9.240
2.	1.960	37.9	38.4	37.9	37.6	37.9	38.4	52	105	113	9.320
3.	1.480	38.0	38.3	38.0	37.6	37.5	38.2	-	-	-	8.960
4.	2.160	38.3	38.5	38.1	37.8	38.1	38.7	-	-	-	9.400
5.	1.660	37.7	37.8	37.8	37.2	37.5	37.9	58	92	104	8.820
6.	1.560	37.9	38.3	38.5	38.1	38.3	38.5	-	-	-	8.740
7.	1.340	37.6	37.4	37.7	37.5	37.8	38.4	-	-	-	8.800
8.	1.520	38.2	38.0	37.8	37.6	37.8	38.2	-	-	-	8.500
9.	1.220	37.5	37.6	37.4	37.7	38.0	38.5	57	101	117	8.160
10	1.780	37.9	38.1	37.8	37.6	37.9	38.2	-	-	-	9.400
11	1.400	38.0	38.4	38.0	38.2	38.4	38.8	-	-	-	8.640
12	1.020	37.3	37.3	37.5	37.3	37.5	37.8	55	79	86	8.020

For the piglets from the females at their third delivery and Mistral treated, the surface drying is recorded in 1 – 2 minutes after parturition, the decrease of

body temperature with 0,5 - 1°C, with the smallest value at the smallest pig - 1,220 kg (37,5°C). At 12 hours the glycaemia raches values of 60 – 107 mg/ml, but the one for with 0,820 kg, only 60mg/ml. At 24 hours after parturition, the glycaemia reaches values of 86 -118 mg/ml. (tabel 5). For the piglets treated with Mistral and Dexamethasone, the body surface drying is recorded in 1 – 2 minutes, with a decrease of body temperature of 0,5 – 1,8°C at 1 hour after parturition. In the first 24 hours the temperature is relatively constant: 37,5 – 38,4°C, with the smallest value in the pig with the smallest body weight at delivery.

At 48 hours after parturition, the temperature is situated between 37,6 - 38,6°C, the values of glycaemia at parturition are 56 – 62 mg/ml, 103 – 108 mg /ml and 109 – 123 mg/ml until 48 hours. The smallest values are recorded in the smallest piglets. (tabel 6)

Analysing the data from the tables representing the body mass of piglets at weaning, it is obvious that the piglets treated with Mistral and Dexamethasone record much higher gain in weight, compared to the control group, thing that will positively reflect on the survival rate at weaning and the weigh at slaughtering.

Tabel 6 The evolution of temperature and glycaemia in the piglets from females at their third parturition, Mistral and Dexamethasone treated

Nr. of piglets	Mass at parturition (kg)	Temperature (°C)						Glycaemia (mg/ml)			Mass at weaning (kg)
		1 h	*3h*	*6 h*	*12h*	*24h*	*48h*	*1h*	*12h*	*24h*	
Nr. matricol 009-126											
1.	1.680	37.9	37.7	38.0	38.3	37.9	38.4	-	-	-	8.920
2.	1.220	37.7	37.9	37.5	37.2	37.8	38.2	-	-	-	8.100
3.	2.240	38.2	38.5	38.1	38.5	38.4	37.9	62	103	116	9.320
4.	1.780	38.0	38.2	37.9	38.4	38.0	38.5	-	-	-	8.880
5.	1.440	37.9	38.0	37.6	38.0	37.7	38.2	-	-	-	8.640
6.	1.500	38.0	37.7	37.4	37.8	38.2	37.8	59	105	112	9.060
7.	1.700	38.2	38.0	38.2	37.8	38.3	38.5	-	-	-	8.900
8.	1.880	38.3	38.4	38.0	38.5	38.1	38.4	-	-	-	9.200
9.	1.120	37.9	37.5	37.4	37.6	37.3	37.8	56	100	109	8.240
10.	1.540	37.8	38.1	37.8	38.0	38.5	38.6	-	-	-	8.540
Nr. matricol 009-081											
1.	1.380	37.8	38.0	37.7	38.1	38.4	37.9	-	-	-	8.460
2.	1.720	37.9	37.5	37.9	38.3	38.0	37.6	-	-	-	8.820
3.	1.980	38.2	38.4	38.0	38.4	38.6	38.4	58	108	123	9.140
4.	1.480	37.8	38.1	37.7	38.2	37.8	38.2	-	-	-	8.780
5.	1.820	38.1	37.7	38.2	37.8	38.4	38.1	-	-	-	9.220
6.	1.840	38.3	38.0	38.4	38.6	38.0	38.6	-	-	-	9.080
7.	1.760	38.0	38.2	37.8	37.7	38.2	38.5	60	106	114	9.100
8.	1.560	38.0	37.6	37.9	38.2	37.8	38.2	-	-	-	8.900
9.	1.400	37.7	37.9	37.5	37.9	38.2	37.9	-	-	-	8.740
10.	1.800	38.1	37.7	37.9	38.3	37.9	38.4	-	-	-	8.600
11.	1.140	37.8	37.4	37.6	37.9	37.6	38.0	56	100	111	8.500
12.	1.340	37.9	38.2	37.9	37.2	37.4	-	-	-	-	-

Conclusions

- The internal temperature at parturition is situated between 36,9 – 38,4^{o}C, the highest values being recorded at the piglets with the highest mass and the other way around, the minimums and maximums being correlated to the body mass in the control but also tested groups, with Mistral and Mistral + Dexamethasone.
- At 1 hour after parturition a decrease in the body temperature is recorded. The body temperature varies between the same limits in the control group and those treated with the mentioned products (0**,**8 – 1,1^{o}C and 0,6 – 1,1^{o}C).
- The glycaemia at 1 hour after parturition records the highest values in the piglets treated with Mistral (58 – 61 mg/ml) and Mistral + Dexametazon, compared to control group (56 – 57 mg/ml).
- The glycaemia values are positively correlated to the highest temperatures, thing that shows that for the piglets which maintain a high temperature, the energy consumption for heat regulation is smaller.
- The highest body mass at weaning is recorded in the Mistral and Mistral + Dexamethasone treated groups, groups that have frequently piglets with a body mass over 1 kg, the maximum value being 9,400 kg, while in the control group we can encounter a single case over 9 kg.

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