A SURVEY OF PERINATAL MORTALITY IN A SWINE HERD

by

JOAN ELLEN WHITE JOHNSON

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Approved by:

H. W. Leipold

Major Professor

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INTRODUCTION

Studies of perinatal death in piglets have been undertaken for many years and many facts have been known to contribute to the death of piglets either *in utero*, during the birth process, or immediately after birth. This study was done to contribute more information to this field in the following areas: the farrowing interval; the sex of the piglet; the differences of being born a sow versus a gilt; the portion of the litter a pig was born-- the first, the middle, or the last; the influences of injecting posterior pituitary oxytocin; the changes evident in body weight, liver weight, and brain weight; and the congenital defects found in the litters. Hopefully, the statistics presented here will help the swine industry in the future.

REVIEW OF LITERATURE

Pomeroy (1960) reported no clear connection between the duration of farrowing and the proportion of stillbirth or neonatal death. England and coworkers (1976) also found that there is little effect of farrowing interval on survival of pigs in litters in which farrowing is of long duration but otherwise proceeded normally and without specific difficulty. However, a positive correlation was seen between the duration of farrowing and the number of pigs stillborn in the study by Bille and coworkers (1974). Sprecher and coworkers (1974) also found the interval between the birth of pigs in a litter affected the prevalence of stillbirth. The mean interval between the birth of a live and subsequent stillborn littermate has been reported by Bunding and coworkers (1972) as 45 to 55 minutes, which compared with 13 to 18 minutes between live pigs and subsequent live littermates.

Pomeroy (1960) and Bereskin and coworkers (1973) found that a normal sexual distribution in piglets was 52% born male. Bille and coworkers (1974) reported that 54.7% of the piglets born in their study were males. Females had a significantly higher survival rate, from 5 to 9% above males in the report by Bereskin and coworkers (1973). However, little or no tendency for mortality to be greater in one sex than in the other was discovered in the studies done by Asdell and William (1941) and by Pomeroy (1960).

The age of the sow had no apparent influence on the number of stillborn ante partum piglets; however, the age of the sow had considerable influence on the frequency of intra partum deaths (during delivery or immediately after) in the studies by Bille and coworkers (1974). Randall (1972b) found that the stillbirth rate increased as the litter number of the sow increased. In litter 1-4, this increase was associated with the concurrent increase in litter size, but in the fifth and subsequent litters, there appeared to be an increase in stillbirth rate which is unrelated to litter size. Glastonbury (1976) felt that preweaning mortality was not significantly affected by the parity of the sow.

Randall (1972a) found that over 82% of stillbirths occurred in the last third of the litter. In the examination of individual litter records the higher incidence of deaths during the later stages of the litter records the higher incidence of deaths during the later stages of the litter was not always associated with prolonged farrowing. In several protracted farrowings, on the other hand, no stillborn piglets were born and this suggests that factors other than the delay prior to delivery are involved (Randall, 1972a). Asdell and William (1941) and Friend and Cunningham (1966) also found the great majority of the stillborn pigs were born late in the litter.

Sprecher and coworkers (1974) felt that the most promising means for reducing stillbirths in swine is through chemical control of parturition induction and duration. In one study done, the injection of pituitrin had markedly cut down the mortality (Asdell and William, 1941). A later study by the same authors showed pituitrin to have no effect on the mortality of the piglets. The effects of a parasympathomimetic drug, carbacholine chloride, on reducing the mean interval between birth of piglets and reducing the number of stillbirths was studied by Sprecher and coworkers (1974). The drug significantly decreased the mean interval between birth of pigs when given after the first piglet was born. There was also a trend toward fewer stillbirths. When the injections of carbachol or neostigmine bromide were administered midway through parturition in an attempt to hasten the delivery of the last pigs in the litter, the stillbirth rate was significantly reduced (Sprecher, 1975). Oxytocin, another drug often used, will also stimulate the smooth muscles of the uterus and cause contraction (Roberts, 1971).

The most important contributory factor to mortality was low birth weight in a study done by Sharpe (1966). She found that the undersized newborn had an immature anatomical development especially of muscle tissue, was more susceptible to cold because of its relatively large surface area and was less able to compete for food. There was a reported negative correlation between litter size at birth and birth weight and lower viability of undersized pigs (Pomeroy, 1960; Saffer and Simon, 1970; Bille et al., 1974). Many workers have shown a correlation between birth weight and mortality (Winters, Cummings and Stewart, 1947; Asdell and William, 1941; Bereskin et al., 1973). Total body weight of the dead piglets varied somewhat from study to study: 2.1 ± 0.07 pounds (Asdell and Willman, 1941), 1160.1 grams (Pomeroy, 1960), 1200 grams (Bille et al., 1974), and 1040.9 ± 42.7 grams (Ullrey et al., 1965). The liver weights recorded by authors also varied: 21.4 ± 8.3 grams (Asdell and Willman, 1941), 35.08 ± .65 grams (Ullrey), and 35 grams (Frape et al., 1969). The brain weights also varied: 29.2 ± 4.2 grams (Asdell and Willman, 1941), 28.0 ± 0.22 grams (Dickenson et al., 1971), and 24.90 ± 2.90 grams (Ullrey et al., 1965).

MATERIALS AND METHODS

From December 1975 to December 1976, all stillborn piglets and piglets that had died within a few days after birth were collected at a large pig farm (approximately 1000 producing gilts and sows) in Southeastern Kansas. It was a standardized procedure at this farm to record on the front of a card the following data for each female entering the farrowing house: the sow or gilt's number, the crate number, the date she entered the crate, the date she farrowed, the litter size, the number of stillborn piglets, and the number of live piglets. A record was also kept on the back of this card of each individual pig in the litter as to the time of birth, if the pig was stillborn, the sex, and the birth weight. It was also noted on the card if the sow or gilt had received a shot of posterior pituitary oxytocin and the time it was given. The cards of the litters containing a stillborn or a piglet that died a few days after birth were made available for this study by the owner of the pig farm.

As the piglets were collected, each was placed in a plastic bag and identified as to the sow or gilt's number, the pig's number in the litter, the sex, the birth weight, and the date of farrowing. The bag was then sealed and placed in a deep freeze located on the farm. Periodically, the piglets were packed in a heavy insulated container to prevent thawing and transported to the Department of Pathology at Kansas State University. The piglets were then placed in a deep freeze in the Perinatal Mortality Laboratory. Five or six piglets at a time were taken from the freezer and allowed to thaw at room temperature. After thawing, each piglet was weighed in its plastic bag. This weight and the identifying information written on the bag were recorded and a standardized necropsy was begun. The piglet was decapitated using a scapel at the atlantal-occipital joint and the head was saved for further examination. The piglet was then placed on the right side and a midline incision was made. The left foreleg was reflected dorsally from the body. The left sacral-femoral joint was disarticulated and the hindleg was reflected dorsally along with the skin covering the thorax and abdomen. The right side of the rib cage was removed by slicing through the costochondral junction near the sternum and manually breaking the dorsal attachments of the ribs. The trachea and esophagus were grasped at their severed ends with a pair of forceps and removed with the heart and lungs. The condition of the lungs was reported as atelectic, partially expanded (if three-fourths or less of the visible lung field was expanded with air), and expanded. The heart was systematically opened and examined for septal defects, patent foramen ovale, and patent ductus arteriosis. Any obvious congenital defect was recorded. The liver was then removed, weighed, and the weight recorded. An examination of the other organs was then made and any congenital defect found was recorded. The skull was opened by removing the top of the calivarium with rongers. The brain was removed and weighed. The brain weight and any congenital defects seen were recorded.

The data from the cards received from the farm and from the necropsy were then compiled. Two groupings of information were made. One group consisted of a listing of each piglet born in which there was complete information on the time of birth; the birth weight; whether the pig was stillborn at birth, live, or a mummy; whether the dam was a sow or a gilt; whether the piglet was a male or female; and whether the dam received an injection of posterior pituitary oxytocin, and if she did, when it was given in relation to the piglet's order of birth. A statistical analysis was performed to determine the independence between live-dead-mummy versus sex (Table I), live-dead-mummy versus sow-gilt (Table II), live-dead-mummy versus piglet order (using the last pig born as number 1) (Table III), and live-dead-mummy versus the relationship of the injection of posterior pituitary oxytocin to the piglet's order of birth (Table IV). Using the information obtained from this analysis, the dead and mummy groups were combined and designated as the dead group. The piglet order was designated as to the first third of the litter, the second third of the litter, and the last third of the litter. The piglets were also regrouped as to whether the dam had not received an injection of posterior pituitary oxytocin, whether the piglet was in the group preceeding the pig before the injection, whether the piglet was the one just before the injection, whether the piglet was the one just after the injection, or whether the piglet was in the group following the piglet which was just after the injection. A statistical analysis of variance was then computed using many factors. There were several factors that were found to be statistically not significant and were dropped from the model. The simplified model then used was Y_{IJK}= Piglet-Order$_I$ + Injection$_J$ + Error$_{IJK}$, where I = 1, 2, or 3 depending upon the third of the litter in which the piglet was born, J = 0, 1, 2, 3, or 4 depending upon where the pig was located in relationship to the injection of posterior pituitary oxytocin, and K = the number of times the I-J combination occurred (Tables V, VI, VII).

The second grouping of information consisted of a listing of the piglets necropsied. Statistical correlations were computed using the birth weight, recorded weight at the time of the necropsy, the liver weight, and the brain weight for the piglets with the atelectic lungs, the piglets that lived less than one day, and the piglets that lived more than one day (Tables VIII, IX, X, XI). These correlations were then plotted by the computer (Graphs 1-16).

RESULTS

Data from 1703 piglets were statistically analyzed by computer. Of these piglets, 168 (9.86%) were dead at birth, 1523 (89.44%) were alive at birth, and 12 (0.70%) were obvious mummies.

Farrowing Interval

According to the first analysis of variance, the time interval between the birth of each piglet was not statistically significant in relationship to whether the piglet was alive, dead, or a mummy.

Sex

Seven hundred-eighty-eight piglets (46.3%) were females; 915 piglets (53.7%) were males. Forty-nine percent of the dead at birth group were females and 51% were males. Forty-six percent of the live group were females and 54% were males. Forty-two percent of the mummies were females and 58% were males. There was a 75% probability that the sex of the piglet was independent of its being dead, live, or a mummy at birth (Table I).

Sow-Gilt

There were 151 litters analyzed; 117 of the litters were from sows and 34 were from gilts. One thousand-three hundred-fifty-one piglets were born to sows and 352 piglets were born to gilts. The sows averaged 11.6 piglets per litter and the gilts averaged 10.4 piglets per litter. There were 628 females (46.5%) and 723 males (53.5%) born to the sows and 160 females (45.5%) and 192 males (54.5%) born to the gilts. Of the sows' piglets, 9.1% were dead at birth, 90.2% were live at birth, and 0.7% were mummies. Of the gilts' piglets, 12.8% were dead at birth, 86.4% were live, and 0.8% were mummies. There was a 10% probability that the dam, whether she was a sow or a gilt, was independent of the piglet's being dead, live, or a mummy at birth (Table II).

Piglet Order

The 1703 piglets were arranged in their litter numerically from the last piglet born to the first piglet born (Table III). There was a 0.07% probability that the piglet's order of birth was independent of its being dead, live, or a mummy at birth. The piglets were then designated as to which third of the litter they were born. The analysis of variance ran by computer showed 516 piglets born in the first third of the litter and 32 of these piglets (6%) were dead at birth (the dead at birth and mummies groups were combined in the analysis of variance). Five hundred-sixty-seven piglets were born in the second third of the litter and 58 of these piglets (10%) were born dead. Six hundred-twenty piglets were born in the last third of the litter and 90 of these piglets (14.5%) were dead at birth. There were 221 females (42.8%) and 295 males (57.2%) born in the first third of the litter, 281 females (49.6% and

286 males (50.4%) born in the second third, and 286 females (46.1)) and 334 males (53.9%) born in the last third of the litter. In the first third of the litter, 411 piglets (79.7%) were born to sows and 105 (20.3%) were born to gilts. In the second third, 449 piglets (79.2%) were born to sows and 118 (20.8%) were born to gilts. In the last third of the litters, 491 piglets (79.2%) were born to sows and 129 (20.8%)) were born to gilts. In the analysis of variance (Table V), it is shown that the pigs in the last third of the litter have a 67% probability of being born alive compared to a 93% probability of in the first third and an 87% probability in the second third.

Injection of Posterior Pituitary Oxytocin

Forty-six of the 151 dams were given injections of posterior pituitary oxytocin. Of these females, 30 (65.2%) were sows and 16 (34.8%) were gilts. This calculated to be 25.6% of the sows and 47% of the gilts in this study were given an injection of posterior pituitary oxytocin. A listing of the numerical order of the piglets before and after the injection of posterior pituitary oxytocin appears in Table IV. There was a 0.05% probability that the numerical relationship of the piglet before or after the injection was independent of its being dead, live, or a mummy at birth (Table IV). These pigs were then classified as to whether they were the piglet after the injection (+1), whether they were in the group after the +1 piglet (>+1), whether they were the piglet just before the injection (-1), whether they were in the group just before the -1 piglet (<-1), or whether they were in a litter that did not receive an injection of posterior pituitary oxytocin (0). In the analysis of variance (Table VI), it is shown that the piglets born just after the shot had a 56% probability that they would be born alive. If this piglet also happened to be the one just after the injection and in the last third of the litter, it had a 20% probability that it would be born alive (Table VI). The least significant differences was statistically significant at the 0.01 level for all piglets born in the last third of the litter and for all pigs born just after the injection of posterior pituitary oxytocin.

Weights

Two hundred-eighteen piglets had complete information as birth weight, recorded weight at necropsy, liver weight, and brain weight. There were 174 piglets placed in the atelectic lung group, 25 that lived less than one day (upon necropsy, this group's lungs were partially expanded), and 19 that lived more than one day (the record cards stated this and upon necropsy, this group's lungs were fully expanded). Of the group that lived less than one day, 17 of these were marked as stillborn on the record cards. Of these 218, 101 were females (46.3%) and 117 were males (53.7%). Eighty-one females and 91 males composed the atelectic lung group, 10 females and 15 males composed the lived less than one day group, and 10 females and 9 males composed the lived more than one day group. One hundred-sixty-three litters were involved.

The birth weights ranged from 226.8 grams to 2041.2 grams. The recorded weights at necropsy ranged from 332.5 grams to 1990.5 grams with a mean of 1057.6 grams and a standard deviation of 378.1 grams. The liver weights ranged from 7.1 grams to 64.4 grams with a mean of 26.6 grams and a standard deviation of 11.5 grams. The brain weights ranged from 5.5 grams to 38.5 grams with a mean of 29.8 grams and a standard deviation of 4.54 grams. In the atelectic lung group, the mean of the birth weight was 1240.6 grams with a standard deviation of 386.5 grams, the mean of the recorded weight was 1106.4 grams with a standard deviation of 359.3 grams, the mean of the liver weight was 27.1 grams with a standard deviation of 10.9 grams, and the mean of the brain weight was 29.9 grams with a standard deviation of 4.8 grams (Table IX). Those living less than one day had a mean birth weight of 1118.1 grams with a standard deviation of 435.8 grams. The mean of the recorded weight was 986.7 grams with a standard deviation of 434.3 grams, the mean of the liver weight was 27.6 grams with a standard deviation of 14.2 grams, and the mean of the brain weight was 29.4 grams with a standard deviation of 3.8 grams (Table X). Those living more than one day had a mean birth weight of 925 grams with a standard deviation of 257.3 grams. The mean of the recorded weight was 703.7 grams with a standard deviation of 262.5 grams, the mean of the liver weight was 21.1 grams with a standard deviation of 12.4 grams, and the mean of the brain weight was

29.7 grams with a standard deviation of 3.1 grams (Table XI). In the analysis of variance, the birth weight tended to be significantly lower in the dead pigs. A correlation was run by computer using the birth weights, the recorded weights at necropsy, the liver weights, and the brain weights. All were found to be statistically highly correlated when the three groups were combined (Table VIII). Correlations were then run on each of the three groups separately. In the atelectic lung group, all of the weights were highly correlated and were significant at the 0.01 level. The weights of the lived less than one day group were also highly correlated and significant at the 0.01 level. The recorded weights and the liver weights of the lived more than one day group were highly correlated and significant at the 0.01 level. The birth weights and the recorded weights were correlated and significant at the 0.05 level. The birth weight-liver weight, birth weight-brain weight, recorded weight-brain weight, and brain weight-liver weight were not significantly correlated.

Congenital Defects

Forty-two piglets were found to have at least one congenital defect upon necropsy (Table XII). Seven piglets had multiple defects (involving more than one organ or system). Twenty-one defects were found involving the skeletonal system, 8 were involving the intestinal system, 6 involving the urinary system, 5 involving the heart, 4 involving the liver, 4 involving the umbilical cord, 3 involving the brain, 2 involving the genital system, and 2 involving the muscular system.

DISCUSSION

The percentage of stillborn piglets (9.86) was higher than the 4 to 7% reported by Bille and coworkers (1974). If the mummies were included in this figure, the percentage rose to 10.56% stillborn. The farrowing interval between piglets in this herd was not a significant finding in the determination of whether a piglet will be alive, dead, or a mummy.

The sex of the piglet seemed to have no effect on whether it was live, dead, or a mummy. The percentage of males (53.7%) came closer to agreeing with the figure 54.7% males as reported by Bille and coworkers (1974) than the 52% males as reported by Pomeroy (1960) and by Bereskin (1973). There was also a greater percentage of males (58%) in the mummy group than in the live group (54%) or in the dead group (51%).

The sows averaged 1.2% more piglets per litter than the gilts. This was expected due to the size and maturity of the sows. The gilts produced 1% more males per litter than the sows. A greater percentage of the stillborn piglets were from gilts (9.8% from sows to 13.6% from gilts). There was a slight relationship between whether the dam was a sow or a gilt and whether the piglet was dead or live at birth.

There was a definite relationship between which third of the litter the pig was born and whether it was alive or dead at birth. There was very little difference between the first and second third of the litter; however, the piglets born in the last third of the litter had a 67% chance of being born alive. This was statistically significant at the 0.01 level when compared to the first third and when compared to the second third of the litter. There was a greater percentage of males born in the first third of the litter (57.2% compared to 50.4% in the second third and 53.9% in the last third).

A greater percent of the gilts required the assistance of an injection of posterior pituitary oxytocin (47% of the gilts surveyed compared to 25.6% of the sows surveyed). There was a 56% probability that the piglet born just after the injection would be born dead. Its percentage of being born dead rose to 80% if the piglet was born in the last third of the litter and was just after an injection of posterior pituitary oxytocin. This piglet could have died due to an uterine inertia of the dam, or it could have been the cause of the problem that led the manager to inject the posterior pituitary oxytocin.

The freezing and thawing procedure did not seem to have a significant effect in that the birth weight and the recorded weight were highly correlated. There was a relationship of the birth weight to the stillborn piglets in that the less the piglet weighed, the greater the chance that it would be born dead (stillborn or a mummy). The piglets with the atelectic lungs weighed more at birth and at necropsy than the other two groups (lived less than one day and lived more than one day). The liver weight averaged 0.5 grams more in the less than one day group than the atelectic lung group; however, the liver of the piglets that lived more than one day averaged 6 grams less than the atelectic lung group. The average brain weights seemed to stay fairly constant in all three groups. The piglets that lived more than one day most probably died from a septicemia or a malnutrition syndrome, and this may be the cause of the considerable drop in weight of the liver resulting in the activation and usage of the energy store in the liver itself. The difference in birth weight and recorded weight may also be due to this postnatal drop in body weight. The reason the brain weight of the lived more than one day group is not correlated with the other weights could be that the brain did not loose the weight in direct proportion to the weight loss of the body and the liver.

Sixty-eight percent of the piglets that had actually gasped for breath, were thought to be stillborn at birth. This fact could reflect on the management of the farrowing house and how closely the farrowing was watched.

Several of the defects found in this herd were inherited defects: the atresia ani, the hydrocephalus, the encephalocele, and the male pseudohermaphrodism (Roberts, 1971). The high amount (5) of the piglets born with a degree of facial hypoplasia-aplasia suggested that this may be inherited.

CONCLUSION

To help reduce the number of stillborn piglets in this herd, a closer watch should be kept of the gilts that are farrowing especially after the fifth pig is born. This information was compiled from the facts arrived at in this survey. The gilts seemed to have more trouble farrowing (47% of the gilts were given an injection of posterior pituitary oxytocin as compared to 25.6% of the sows surveyed), and the gilts had a greater percentage of stillborn piglets (12.8% as compared to 9.1%). The last third of the litter was certainly where the greatest percent of dead piglets were born (14.5% of the piglets born in the first third were born dead as compared to 6% in the first third and 10% in the second third). Therefore, halfway through the farrowing, special attention should be paid to the progress the gilt is having and posterior pituitary oxytocin should be conscientiously used. Only 20% of the piglets lived that were born in the last third of the litter and were the piglet just after the injection of posterior pituitary oxytocin. There did seem to be a relationship between the liver, brain and body weights of the perinatally dead pigs that was not present in the piglets that died after the first day.

Special effort should also be made in trying to reduce the number of congenital defects. Of the 234 piglets necropsied, 17.95% of them had a congenital defect. The facial hypoplasia problem should be studied further to determine if it was indeed an hereditary defect.

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APPENDIX

TABLES

TABLE I

Statistical Analysis of Dead-Live-Mummy by Sex

		Female	Male	Total
	Frequency	82	86	168
Dead	Expected	77.7	90.3	
At	Deviation	4.3	-4.3	
Birth	Cell CHI^2	0.2	0.2	
	Percent	4.82	5.05	9.86%
	Row Percent	48.81	51.19	
	Frequency	701	822	1523
Alive	Expected	704.1	818.3	
At	Deviation	-3.7	3.7	
Birth	Cell CHI^2	0.0	0.0	
	Percent	41.16	48.27	89.43%
	Row Percent	46.03	53.97	
	Frequency	5	7	12
	Expected	5.6	6.4	
Mummy	Deviation	-0.6	0.6	
	Cell CHI^2	0.1	0.0	
	Percent	0.29	0.41	0.70%
	Row Percent	41.67	58.33	
Total		788	915	1703
		46.27%	53.73%	100.00%

CHI-SQUARE = 0.574 with 2 degrees of freedom

Probability of greater value under HO = 0.7505

TABLE II

Statistical Analysis of Dead-Live-Mummy by Sow-Gilt

		Sow	Gilt	Total
	Frequency	123	45	168
	Expected	133.3	34.7	
Dead	Deviation	-10.3	10.3	
At	Cell CHI^2	0.8	3.0	
Birth	Percent	7.22	2.64	9.86%
	Row Percent	73.21	26.79	
	Column Percent	9.10	12.78	
	Frequency	1219	304	1523
	Expected	1208.2	314.8	
Alive	Deviation	10.8	-10.8	
At	Cell CHI^2	0.1	0.4	
Birth	Percent	71.58	17.85	89.43%
	Row Percent	80.04	19.96	
	Column Percent	90.23	86.36	
	Frequency	9	3	12
	Expected	9.5	2.5	
	Deviation	-0.5	0.5	
Mummy	Cell CHI^2	0.0	0.1	
	Percent	0.53	0.18	0.73%
	Row Percent	75.00	25.00	
	Column Percent	0.67	0.85	
Total		1351	352	1703
		79.33%	20.67%	100.00%

CHI-SQUARE = 4.437 with 2 degrees of freedom

Probability of greater value under HO = 0.1088

TABLE III

Statistical Analysis of Dead-Live-Mummy by Pig Order

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	32	114	2	148
Last	Expected	14.6	132.4	1.0	
Piglet	Deviation	17.4	-18.4	1.0	
Born	Cell CHI^2	20.7	2.5	0.9	
	Percent	1.88	6.69	0.12	8.69%
	Column Percent	19.05	7.49	16.67	
	Frequency	21	126	1	148
Second	Expected	14.6	132.4	1.0	
To	Deviation	6.4	-6.4	-0.0	
Last	Cell CHI^2	2.8	0.3	0.0	
Born	Percent	1.23	7.40	0.06	8.69%
	Column Percent	12.50	8.27	8.33	
	Frequency	20	126	2	148
Third	Expected	14.6	132.4	1.0	
To	Deviation	5.4	-6.4	1.0	
Last	Cell CHI^2	2.0	0.3	0.9	
	Percent	1.17	7.40	0.12	8.69%
	Column Percent	11.90	8.27	16.67	

TABLE III (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	20	123	3	146
Fourth	Expected	14.4	130.6	1.0	
To	Deviation	5.6	-7.6	2.0	
Last	Cell CHI^2	2.2	0.4	3.8	
	Percent	1.17	7.22	0.18	8.57%
	Column Percent	11.90	8.08	25.00	
	Frequency	19	126	0	145
Fifth	Expected	14.3	129.7	1.0	
To	Deviation	4.7	-3.7	-1.0	
Last	Cell CHI^2	1.5	0.1	1.0	
	Percent	1.12	7.40	0.00	8.51%
	Column Percent	11.31	8.27	0.00	
	Frequency	12	129	2	143
Sixth	Expected	14.1	127.9	1.0	
To	Deviation	-2.1	1.1	1.0	
Last	Cell CHI^2	0.3	0.0	1.0	
	Percent	0.70	7.57	0.12	8.40%
	Column Percent	7.14	8.47	16.67	

TABLE III (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	9	131	1	141
Seventh	Expected	13.9	126.1	1.0	
To	Deviation	-4.9	4.9	0.0	
Last	Cell CHI^2	1.7	0.2	0.0	
	Percent	0.53	7.69	0.06	8.28%
	Column Percent	5.36	8.60	8.33	
	Frequency	9	129	0	138
Eighth	Expected	13.6	123.4	1.0	
To	Deviation	-4.6	5.6	-1.0	
Last	Cell CHI^2	1.6	0.3	1.0	
	Percent	0.53	7.57	0.00	8.10%
	Column Percent	5.36	8.47	0.00	
	Frequency	8	122	0	130
Ninth	Expected	12.8	116.3	0.9	
To	Deviation	-4.8	5.7	-0.9	
Last	Cell CHI^2	1.8	0.3	0.9	
	Percent	0.47	7.16	0.00	7.63%
	Column Percent	4.76	8.01	0.00	

TABLE III (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	5	115	1	121
Tenth	Expected	11.9	108.2	0.9	
To	Deviation	-6.9	6.8	0.1	
Last	Cell CHI^2	4.0	0.4	0.0	
	Percent	0.29	6.75	0.06	7.11%
	Column Percent	2.98	7.55	8.33	
	Frequency	5	95	0	100
Eleventh	Expected	9.9	89.4	0.7	
To	Deviation	-4.9	5.6	-0.7	
Last	Cell CHI^2	2.4	0.3	0.7	
	Percent	0.29	5.58	0.00	5.87%
	Column Percent	2.98	6.24	0.00	
	Frequency	5	71	0	76
Twelfth	Expected	7.5	68.0	0.5	
To	Deviation	-2.5	3.0	-0.5	
Last	Cell CHI^2	0.8	0.1	0.5	
	Percent	0.29	4.17	0.00	4.46%
	Column Percent	2.98	4.66	0.00	

TABLE III (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	1	52	0	53
Thirteenth	Expected	5.2	47.4	0.4	
To	Deviation	-4.2	4.6	-0.4	
Last	Cell CHI^2	3.4	0.4	0.4	
	Percent	0.06	3.05	0.00	3.11%
	Column Percent	0.60	3.41	0.00	
	Frequency	1	31	0	32
Fourteenth	Expected	3.2	28.6	0.2	
To	Deviation	-2.2	2.4	-0.2	
Last	Cell CHI^2	1.5	0.2	0.2	
	Percent	0.06	1.82	0.00	1.88%
	Column Percent	0.60	2.04	0.00	
	Frequency	1	17	0	18
Fifteenth	Expected	1.8	16.1	0.1	
To	Deviation	-0.8	0.9	-0.1	
Last	Cell CHI^2	0.3	0.1	0.1	
	Percent	0.06	1.00	0.00	1.06%
	Column Percent	0.60	1.12	0.00	

TABLE III (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	0	11	0	11
Sixteenth	Expected	1.1	9.8	0.1	
To	Deviation	-1.1	1.2	-0.1	
Last	Cell CHI^2	1.1	0.1	0.1	
	Percent	0.00	0.65	0.00	0.65%
	Column Percent	0.00	0.72	0.00	
	Frequency	0	4	0	4
Seventeenth	Expected	0.4	3.6	0.0	
To	Deviation	-0.4	0.4	-0.0	
Last	Cell CHI^2	0.4	0.0	0.0	
	Percent	0.00	0.23	0.00	0.23%
	Column Percent	0.00	0.26	0.00	
	Frequency	0	1	0	1
Eighteenth	Expected	0.1	0.9	0.0	
To	Deviation	-0.1	0.1	-0.0	
Last	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	
Total		168	1523	12	1703
		9.86%	89.43%	0.70%	100.00%

CHI-SQUARE = 66.522 with 34 degrees of freedom.
Probability of greater value under HO = 0.0007

TABLE IV

Statistical Analysis of Dead-Live-Mummy by Injection of Posterior Pituitary Oxytocin (POP)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	0	1	0	1
Fourteenth	Expected	0.1	0.9	0.0	
Piglet	Deviation	-0.1	0.1	-0.0	
Before	Cell CHI^2	0.1	0.0	0.0	
Injection	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	
	Frequency	0	1	0	1
Thirteenth	Expected	0.1	0.9	0.0	
Before	Deviation	-0.1	0.1	-0.0	
Injection	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	
	Frequency	0	1	0	1
Twelfth	Expected	0.1	0.9	0.0	
Before	Deviation	-0.1	0.1	-0.0	
Injection	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	0	1	0	1
Eleventh	Expected	0.1	0.9	0.0	
Before	Deviation	-0.1	0.1	-0.0	
Injection	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	
	Frequency	0	3	0	3
Tenth	Expected	0.3	2.7	0.0	
Before	Deviation	-0.3	0.3	-0.0	
Injection	Cell CHI^2	0.3	0.0	0.0	
	Percent	0.00	0.18	0.00	0.18%
	Column Percent	0.00	0.20	0.00	
	Frequency	0	3	0	3
Ninth	Expected	0.3	2.7	0.0	
Before	Deviation	-0.3	0.3	-0.0	
Injection	Cell CHI^2	0.3	0.0	0.00	
	Percent	0.00	0.18	0.00	0.18%
	Column Percent	0.00	0.20	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	0	3	0	3
Eighth	Expected	0.3	2.7	0.0	
Before	Deviation	-0.3	0.3	-0.0	
Injection	Cell CHI^2	0.3	0.0	0.0	
	Percent	0.00	0.18	0.00	0.18%
	Column Percent	0.00	0.20	0.00	
	Frequency	1	4	1	6
Seventh	Expected	0.6	5.4	0.0	
Before	Deviation	0.4	-1.4	1.0	
Injection	Cell CHI^2	0.3	0.3	21.7	
	Percent	0.06	0.23	0.06	0.35%
	Column Percent	0.60	0.26	8.33	
	Frequency	1	5	0	6
Sixth	Expected	0.6	5.4	0.0	
Before	Deviation	0.4	-0.4	-0.0	
Injection	Cell CHI^2	0.3	0.0	0.0	
	Percent	0.06	0.29	0.00	0.35%
	Column Percent	0.60	0.33	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	0	8	0	8
Fifth	Expected	0.8	7.2	0.1	
Before	Deviation	-0.8	0.8	-0.1	
Injection	Cell CHI^2	0.8	0.1	0.1	
	Percent	0.00	0.47	0.00	0.47%
	Column Percent	0.00	0.53	0.00	
	Frequency	0	11	0	11
Fourth	Expected	1.1	9.8	0.1	
Before	Deviation	-1.1	1.2	-0.1	
Injection	Cell CHI^2	1.1	0.1	0.1	
	Percent	0.00	0.65	0.00	0.65%
	Column Percent	0.00	0.72	0.00	
	Frequency	1	18	0	19
Third	Expected	1.9	17.0	0.1	
Before	Deviation	-0.9	1.0	-0.1	
Injection	Cell CHI^2	0.4	0.1	0.1	
	Percent	0.06	1.06	0.00	1.12%
	Column Percent	0.60	1.18	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	1	32	0	33
Second	Expected	3.3	29.5	0.2	
Before	Deviation	-2.3	2.5	-0.2	
Injection	Cell CHI^2	1.6	0.2	0.2	
	Percent	0.06	1.88	0.00	1.94%
	Column Percent	0.60	2.10	0.00	
	Frequency	5	39	0	44
Piglet	Expected	4.3	39.3	0.3	
Born	Deviation	0.7	-0.3	-0.3	
Before	Cell CHI^2	0.1	0.0	0.3	
Injection	Percent	0.29	2.29	0.00	2.58%
	Column Percent	2.98	2.56	0.00	
	Frequency	103	1047	6	1156
Piglets from	Expected	114.0	1033.8	8.1	
Litters not	Deviation	-11.0	13.2	-2.1	
Given	Cell CHI^2	1.1	0.2	0.6	
Injection	Percent	6.05	61.48	0.35	67.88%
	Column Percent	61.31	68.75	50.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	12	33	0	45
Piglet	Expected	4.4	40.2	0.3	
Born	Deviation	7.6	-7.2	-0.3	
After	Cell CHI^2	12.9	1.3	0.3	
Injection	Percent	0.70	1.94	0.00	2.64%
	Column Percent	7.14	2.17	0.00	
	Frequency	1	41	0	42
Second	Expected	4.1	37.6	0.3	
After	Deviation	-3.1	3.4	-0.3	
Injection	Cell CHI^2	2.4	0.3	0.00	
	Percent	0.06	2.41	0.00	2.47%
	Column Percent	0.60	2.69	0.00	
	Frequency	8	34	0	42
Third	Expected	4.1	37.6	0.3	
After	Deviation	3.9	-3.6	-0.3	
Injection	Cell CHI^2	3.6	0.3	0.3	
	Percent	0.47	2.00	0.00	2.47%
	Column Percent	4.76	2.23	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	2	36	1	39
Fourth	Expected	3.8	34.9	0.3	
After	Deviation	-1.8	1.1	0.7	
Injection	Cell CHI^2	0.9	0.0	1.9	
	Percent	0.12	2.11	0.06	2.29%
	Column Percent	1.19	2.36	8.33	
	Frequency	4	33	1	38
Fifth	Expected	3.7	34.0	0.3	
After	Deviation	0.3	-1.0	0.7	
Injection	Cell CHI^2	0.0	0.0	2.0	
	Percent	0.23	1.94	0.06	2.23%
	Column Percent	2.38	2.13	8.53	
	Frequency	4	33	0	37
Sixth	Expected	3.7	33.1	0.3	
After	Deviation	0.3	-0.1	-0.3	
Injection	Cell CHI^2	0.0	0.0	0.3	
	Percent	0.23	1.94	0.00	2.17%
	Column Percent	2.38	2.17	0.00	

TABLE IV (continued

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	3	34	0	37
Seventh	Expected	3.7	33.1	0.3	
After	Deviation	-0.7	0.9	-0.3	
Injection	Cell CHI^2	0.1	0.0	0.3	
	Percent	0.18	2.00	0.00	2.17%
	Column Percent	1.79	2.23	0.00	
	Frequency	2	30	1	33
Eighth	Expected	3.3	29.5	0.2	
After	Deviation	-1.3	0.5	0.8	
Injection	Cell CHI^2	0.5	0.0	2.5	
	Percent	0.12	1.76	0.06	1.94%
	Column Percent	1.19	1.97	8.33	
	Frequency	5	24	0	29
Ninth	Expected	2.9	25.9	0.2	
After	Deviation	2.1	-1.9	-0.2	
Injection	Cell CHI^2	1.6	0.1	0.2	
	Percent	0.29	1.41	0.00	1.70%
	Column Percent	2.98	1.58	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	6	17	1	24
Tenth	Expected	2.4	21.5	0.2	
After	Deviation	3.6	-4.5	0.8	
Injection	Cell CHI^2	5.6	0.9	4.1	
	Percent	0.35	1.00	0.06	1.41%
	Column Percent	3.57	1.12	8.33	
	Frequency	5	12	0	17
Eleventh	Expected	1.7	15.2	0.1	
After	Deviation	3.3	-3.2	-0.1	
Injection	Cell CHI^2	6.6	0.7	0.1	
	Percent	0.29	0.70	0.00	1.00%
	Column Percent	2.98	0.79	0.00	
	Frequency	1	10	1	12
Twelfth	Expected	1.2	10.7	0.1	
After	Deviation	-0.2	-0.7	0.9	
Injection	Cell CHI^2	0.0	0.0	9.9	
	Percent	0.6	0.59	0.06	0.70%
	Column Percent	0.60	0.66	8.33	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	1	6	0	7
Thirteenth	Expected	0.7	6.3	0.0	
After	Deviation	0.3	-0.3	-0.0	
Injection	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.06	0.35	0.00	0.41%
	Column Percent	0.60	0.39	0.00	
	Frequency	1	2	0	3
Fourteenth	Expected	0.3	2.7	0.0	
After	Deviation	0.7	-0.7	-0.0	
Injection	Cell CHI^2	1.7	0.2	0.0	
	Percent	0.06	0.12	0.00	0.18%
	Column Percent	0.60	0.13	0.00	
	Frequency	0	1	0	1
Fifteenth	Expected	0.1	0.9	0.0	
After	Deviation	-0.1	0.1	-0.0	
Injection	Cell CHI^2	0.1	0.0	0.0	
	Percent	0.00	0.06	0.00	0.06%
	Column Percent	0.00	0.07	0.00	

TABLE IV (continued)

		Dead At Birth	Alive At Birth	Mummy	Total
	Frequency	1	0	0	1
Sixteenth	Expected	0.1	0.9	0.0	
After	Deviation	0.9	-0.9	-0.0	
Injection	Cell CHI^2	8.2	0.9	0.0	
	Percent	0.06	0.00	0.00	0.06%
	Column Percent	0.60	0.00	0.00	
Total		168	1523	12	1703
		9.86%	89.43%	0.70%	100.00%

CHI-SQUARE = 102.823 with 60 degrees of freedom.

Probability of greater value under HO = 0.0005.

TABLE V

Analysis of Variance for Status

Source	Degrees of Freedom	Sums of Squares	Mean Squares	F-Ratio	Probability
Third of Litter	2	2.20242208	1.10121059	12.596	0.0000
Injection	4	2.98746866	0.74686712	8.543	0.0000
Third of Litter* Injection	8	1.68805699	0.21100712	2.414	0.0136
Residual	1688	147.57499695	0.08742589		
Total	1702	156.22195435			

Beta Vector		Beta Vector (cont.)	
1	0.82414216	8	-0.03803786
2	0.10316509	9	-0.08093828
3	0.04939240	10	0.02541216
4	0.07992202	11	0.15697372
5	0.13934541	12	-0.04906721
6	-0.00986499	13	-0.10812008
7	-0.26075405	14	0.13631582
		15	0.05386936

TABLE VI

Means and Standard Errors for Status

Source	Sub-Class Levels	Mean	Standard Error
Third of Litter	1	0.9273072	0.017897
Third of Litter	2	0.8735345	0.038489
Third of Litter	3	0.6715847	0.048018
Injection	0	0.9040642	0.008724
Injection	<-1	0.9634876	0.050439
Injection	-1	0.8142772	0.068182
Injection	+1	0.5633881	0.062028
Injection	>+1	0.8754938	0.017116
Third of Litter 1* Injection 0		0.9691910	0.014393
Third of Litter 1* Injection <-1		0.9857140	0.035340
Third of Litter 1* Injection -1		0.9428544	0.049979
Third of Litter 1* Injection +1		0.8235269	0.050708
Third of Litter 1* Injection >+1		0.9152471	0.038494
Third of Litter 2* Injection 0		0.9043893	0.015030
Third of Litter 2* Injection <-1		0.9047593	0.064522
Third of Litter 2* Injection -1		0.9999853	0.132231
Third of Litter 2* Injection +1		0.6666498	0.120710
Third of Litter 2* Injection >+1		0.8918880	0.024305
Third of Litter 3* Injection 0		0.8386117	0.015873
Third of Litter 3* Injection <-1		0.9999884	0.132231
Third of Litter 3* Injection -1		0.4999917	0.147839

TABLE VI (continued)

Source	Sub-Class Levels	Mean	Standard Error
Third of Litter 3* Injection +1		0.1999875	0.132231
Third of Litter 3* Injection >+1		0.8193437	0.023749

TABLE VII

Least Significant Differences for Status

Third of Litter		Mean Difference	Standard Error	L.S.D.
1st Third	2nd Third	0.053773	0.042447	0.109343
1st Third	3rd Third	0.255723	0.51244	0.132006**
2nd Third	3rd Third	0.201950	0.61540	0.158527**
Injection				
0	<-1	-0.059423	0.051188	0.131861
0	-1	0.089787	0.068738	0.177070
0	+1	0.340676	0.062639	0.161357**
0	>+1	0.028570	0.019211	0.049488
<-1	-1	0.149210	0.084811	0.218474
<-1	+1	0.400099	0.079948	0.205945**
<-1	>+1	0.087994	0.053264	0.137209
-1	+1	0.250889	0.092176	0.237444**
-1	>+1	-0.061217	0.070298	0.181087
+1	>+1	-0.312106	0.064346	0.165756**

**Denotes significance at 1% level.

TABLE VIII*

Simple Correlations of Weights of Composite Group

	Mean	Variance	Standard Deviation	Standard Error
Birth Weight	1199.08227539	154280.396894	392.785400	26.602783
Recorded Weight	1057.59741211	142978.990490	378.125488	25.609894
Liver Weight	26.59815974	132.695175	11.519339	0.780188
Brain Weight	29.83071899	20.538634	4.531957	0.306943

Correlations

	Birth Wt.	Recorded Wt.	Liver Wt.	Brain Wt.
Birth Wt.	1.0000**			
Recorded Wt.	0.9334**	1.0000**		
Liver Wt.	0.7211**	0.7850**	1.0000**	
Brain Wt.	0.5710**	0.5993**	0.4852**	1.000**

**Significant at 0.01 level.

*Graphs 1-4.

TABLE IX*

Simple Correlations of Weights of Atelectie Lung Group

	Mean	Variance	Standard Deviation	Standard Error
Birth Weight	1240.63012695	149363.388035	386.475586	29.298630
Recorded Weight	1106.42626953	129123.517546	359.337402	27.241302
Liver Weight	27.06033325	118.539492	10.887584	0.825396
Brain Weight	29.91148376	22.786800	4.773552	0.361882

Correlations	Birth Wt.	Recorded Wt.	Liver Wt.	Brain Wt.
Birth Wt.	1.0000**			
Recorded Wt.	0.9465**	1.0000**		
Liver Wt.	0.7275**	0.7701**	1.0000**	
Brain Wt.	0.5754**	0.6345**	0.5000**	1.0000**

*Graphs 5-8.

**Significant at 0.01 level.

TABLE X*

Simple Correlations of the Lived Less Than One Day Group

	Mean	Variance	Standard Deviation	Standard Error
Birth Weight	1118.12768555	189882.110829	435.754639	87.150925
Recorded Weight	986.72778320	188629.468388	434.314941	86.862976
Liver Weight	27.59197998	203.037375	14.249118	2.849823
Brain Weight	29.39198303	14.106600	3.755875	0.751175

Correlations	Birth Wt.	Recorded Wt.	Liver Wt.	Brain Wt.
Birth Wt.	1.0000**			
Recorded Wt.	0.9547**	1.0000**		
Liver Wt.	0.8222**	0.8519**	1.0000**	
Brain Wt.	0.7772**	0.7137**	0.6713**	1.0000**

*Graphs 9-12.

**Significant at 0.01 level.

TABLE XI*

Simple Correlations of the Lived More Than One Day Group

	Mean	Variance	Standard Deviation	Standard Error
Birth Weight	925.11035156	66191.753785	257.277344	59.023514
Recorded Weight	703.67871094	68924.012130	262.533691	60.229385
Liver Weight	21.05789185	153.864791	12.404224	2.845724
Brain Weight	29.66841125	9.431172	3.071021	0.704541

Correlations	Birth Wt.	Recorded Wt.	Liver Wt.	Brain Wt.
Birth Wt.	1.0000**			
Recorded Wt.	0.5494***	1.0000**		
Liver Wt.	0.4474	0.9345**	1.0000**	
Brain Wt.	0.2864	0.2803	0.1841	1.0000**

*Graphs 13-16.

**Significant at 0.01 level.

***Significant at 0.05 level.

TABLE XII

Congenital Defects Encountered During Necropsy of 234 Piglets

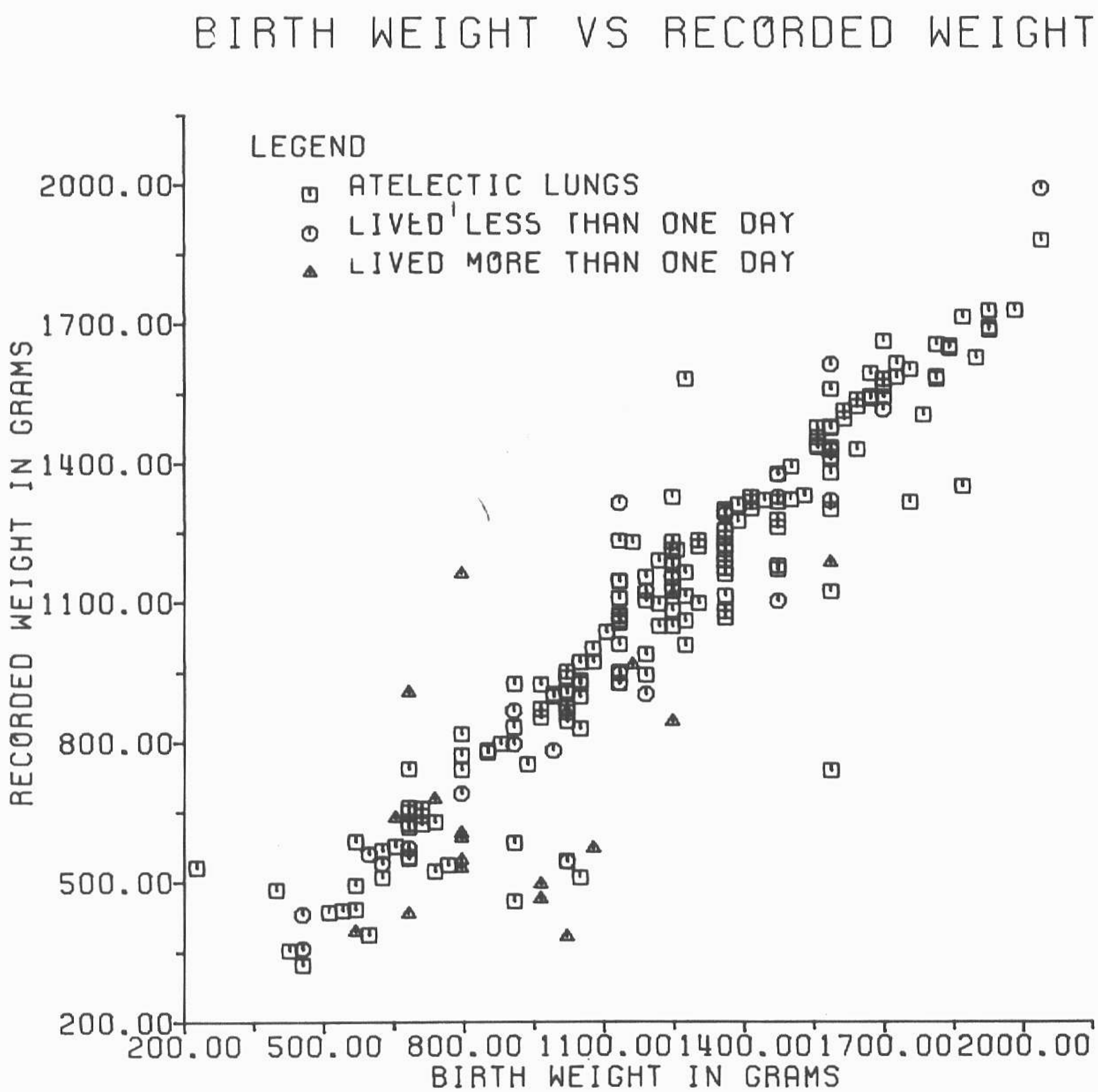
<u>Skeletonal System</u>		<u>21 total</u>
Fontanelles not closed	9	
Skull fractures	2	
Facial Hypoplasia (Figs. H, I, J, L)	3	
Agnathia-Astomia (Figs. M, N, O)	1	
Facial Aplasia (Aprosopia) (Fig. K, L)	1	
Arthrogryposis of front legs	1	
Opisthotonus	1	
Persomus elumbis (Fig. F)	1	
Conjoined twins (Fig. G)	1	
Two-headed piglet	1	
<u>Intestinal System</u>		<u>8 total</u>
Conjoined jejunum	1	
Segmental aplasia of jejunum	1	
Conjoined cecum	1	
Atresia coli	2	
Atresia ani	3	
<u>Urinary System</u>		<u>6 total</u>
Horseshoe (fused) kidney	2	
Enlarged kidneys	2	
Kidney cyst (10 cm. diameter)	1	
Patent urachus	1	
<u>Heart</u>		<u>5 total</u>
High Ventricular Septal Defects	4	
Three-chambered Heart	1	

TABLE XII (continued)

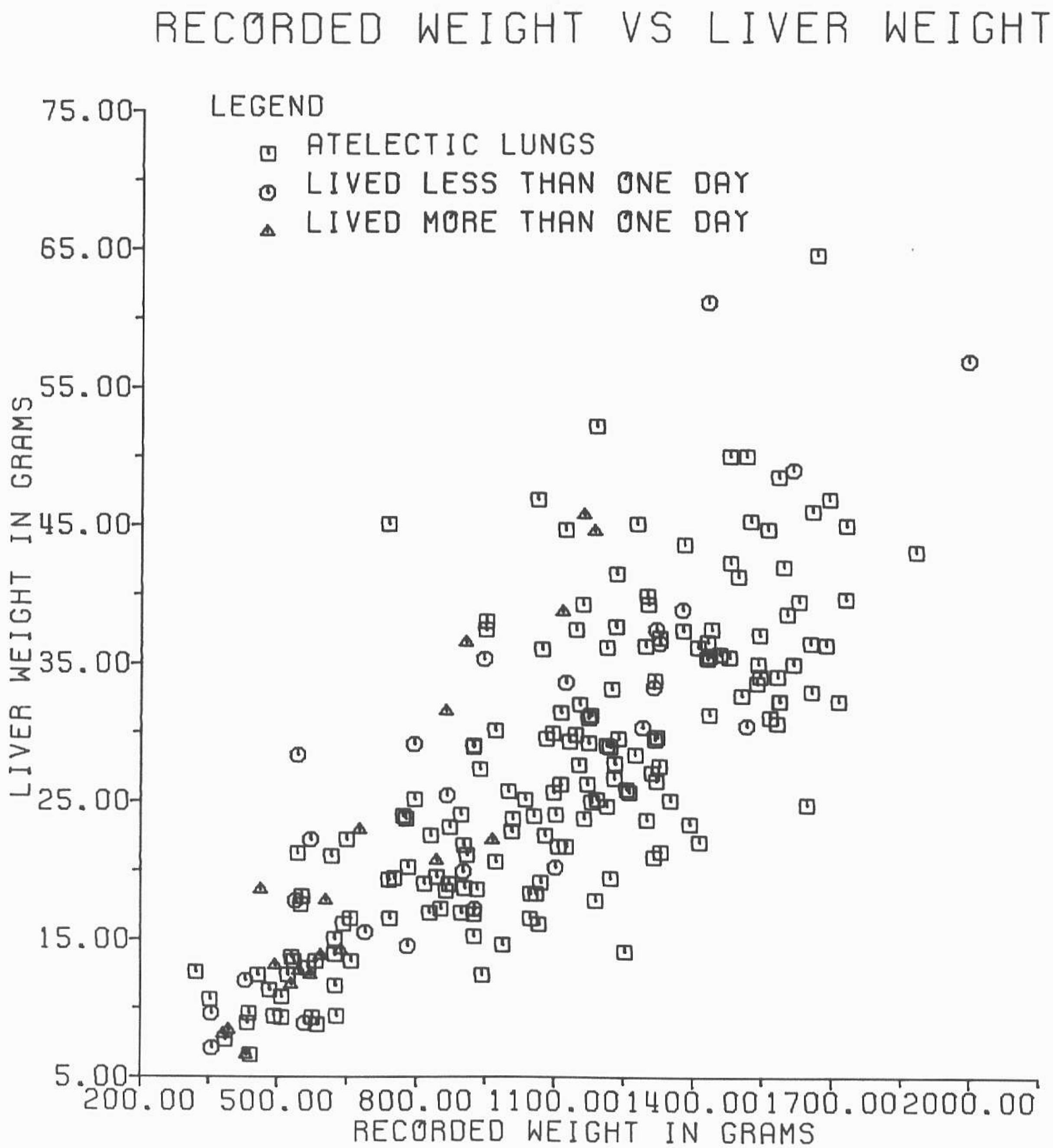
Liver		4 total
Conjoined liver	1	
Liver cyst	2	
Ruptured liver	1	
Umbilical Cord		4 total
Blood Clots	2	
Wrapped around neck	2	
Brain		3 total
Anencephaly	1	
Hydrocephalus (Fig. B, C)	1	
Encephalocele (Fig. D, E)	1	
Genital System		2 total
Male pseudohermaphrodite	2	
Muscular System		2 total
Muscular atrophy	1	
Diaphragmatic hernia	1	

42 piglets - 55 congenital defects
7 piglets with multiple defects

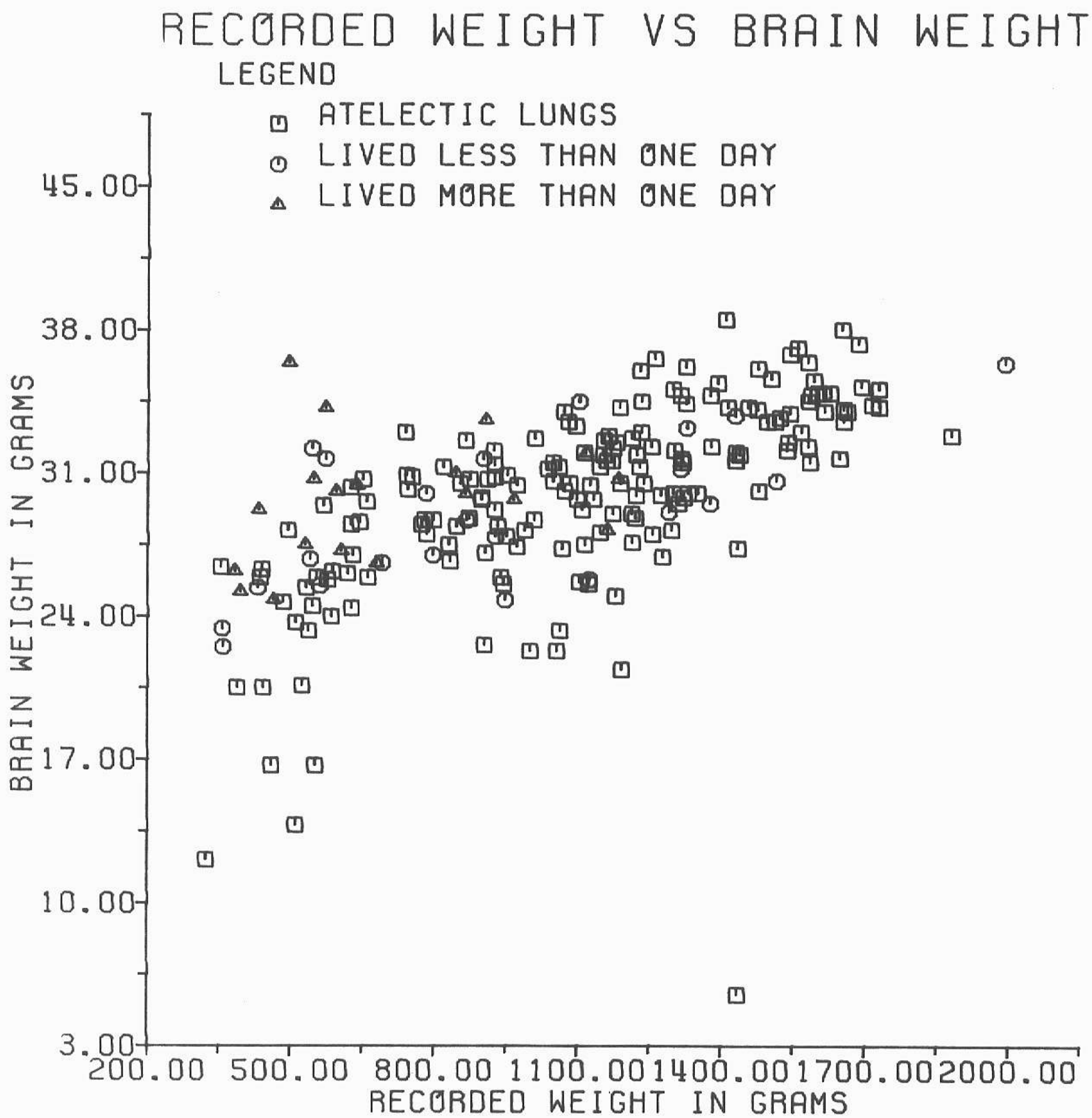
GRAPHS



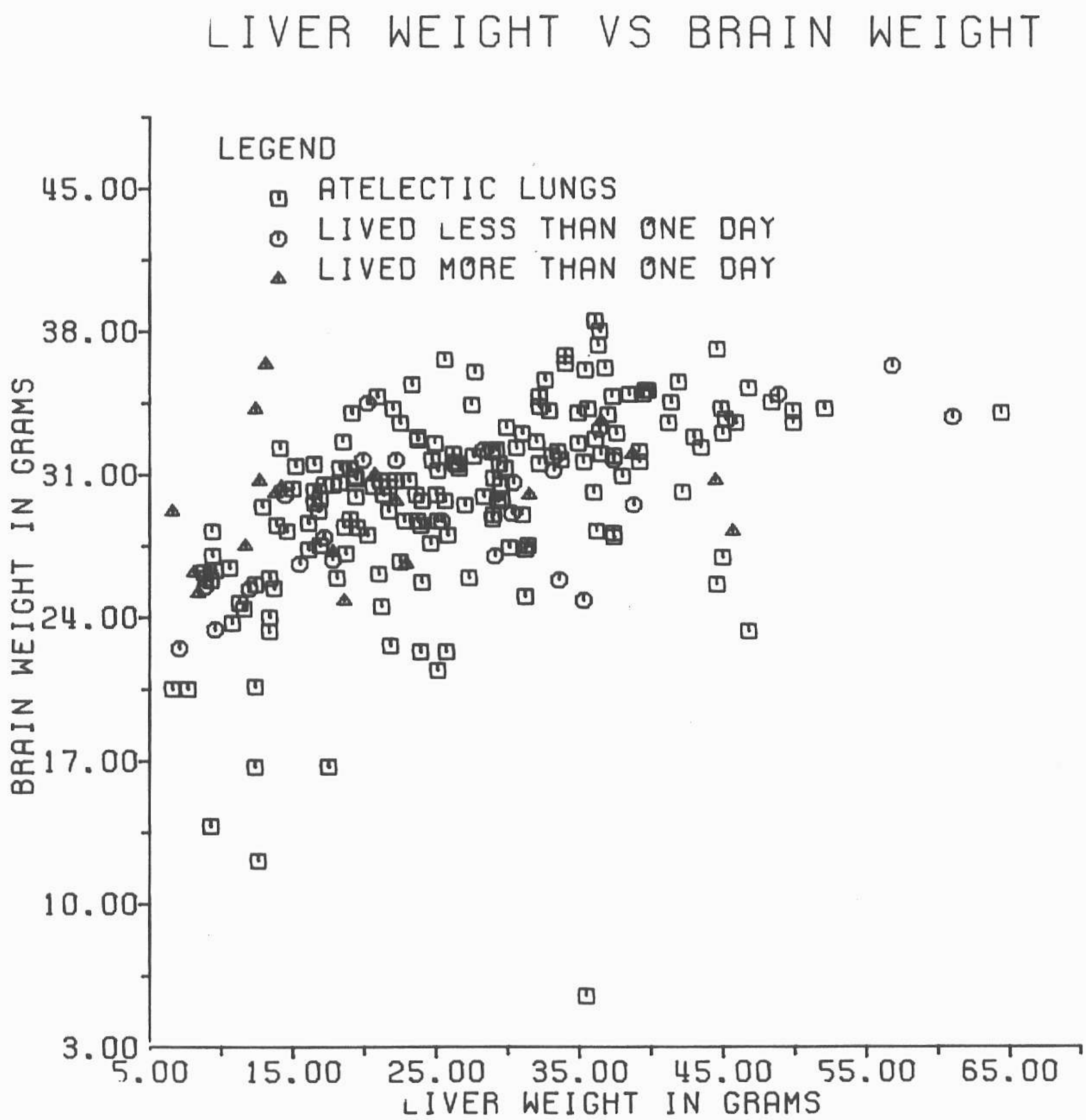
Graph 1. This correlation was statistically significant at the 0.01 level.



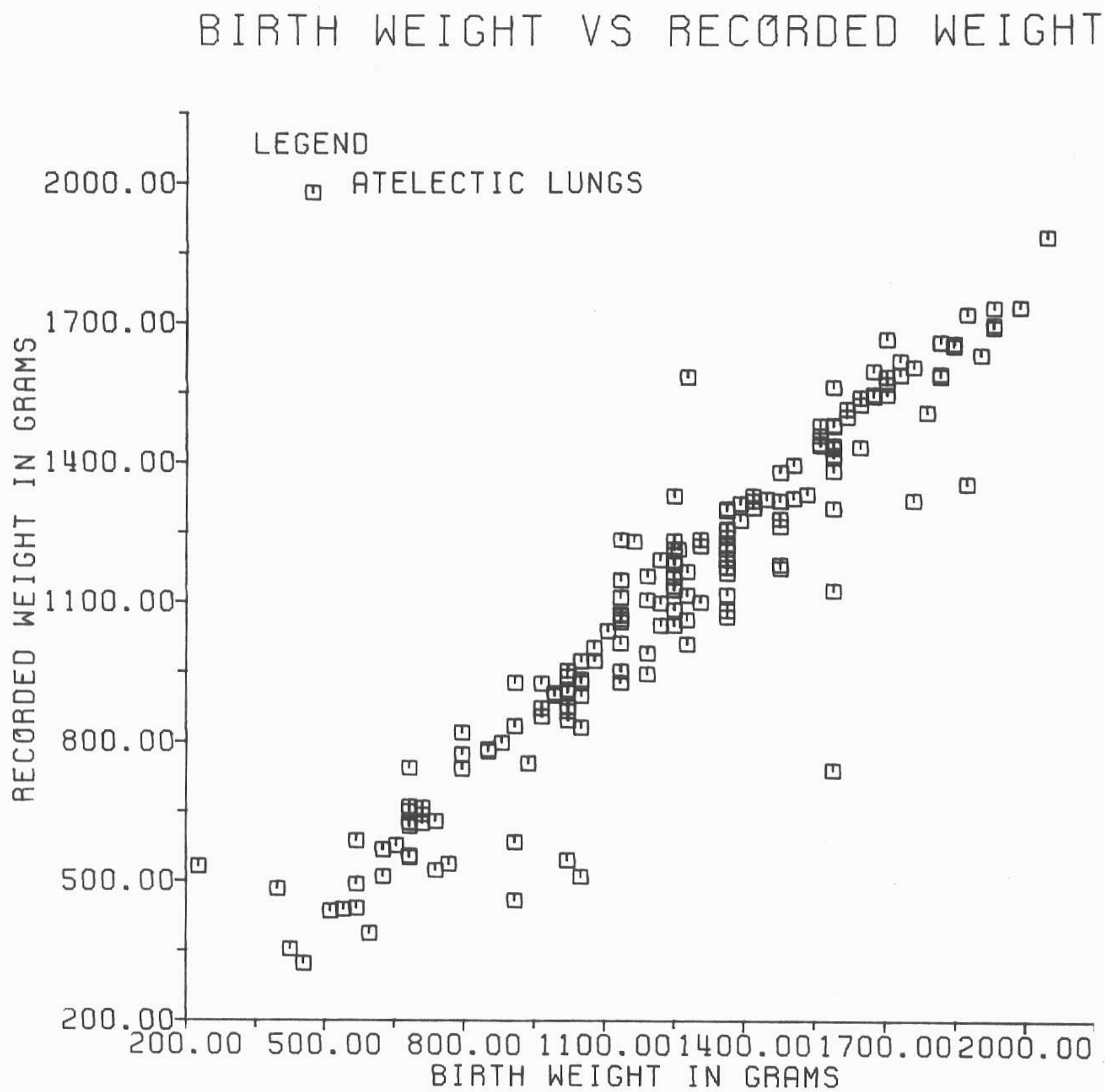
Graph 2. This correlation was statistically significant at the 0.01 level.



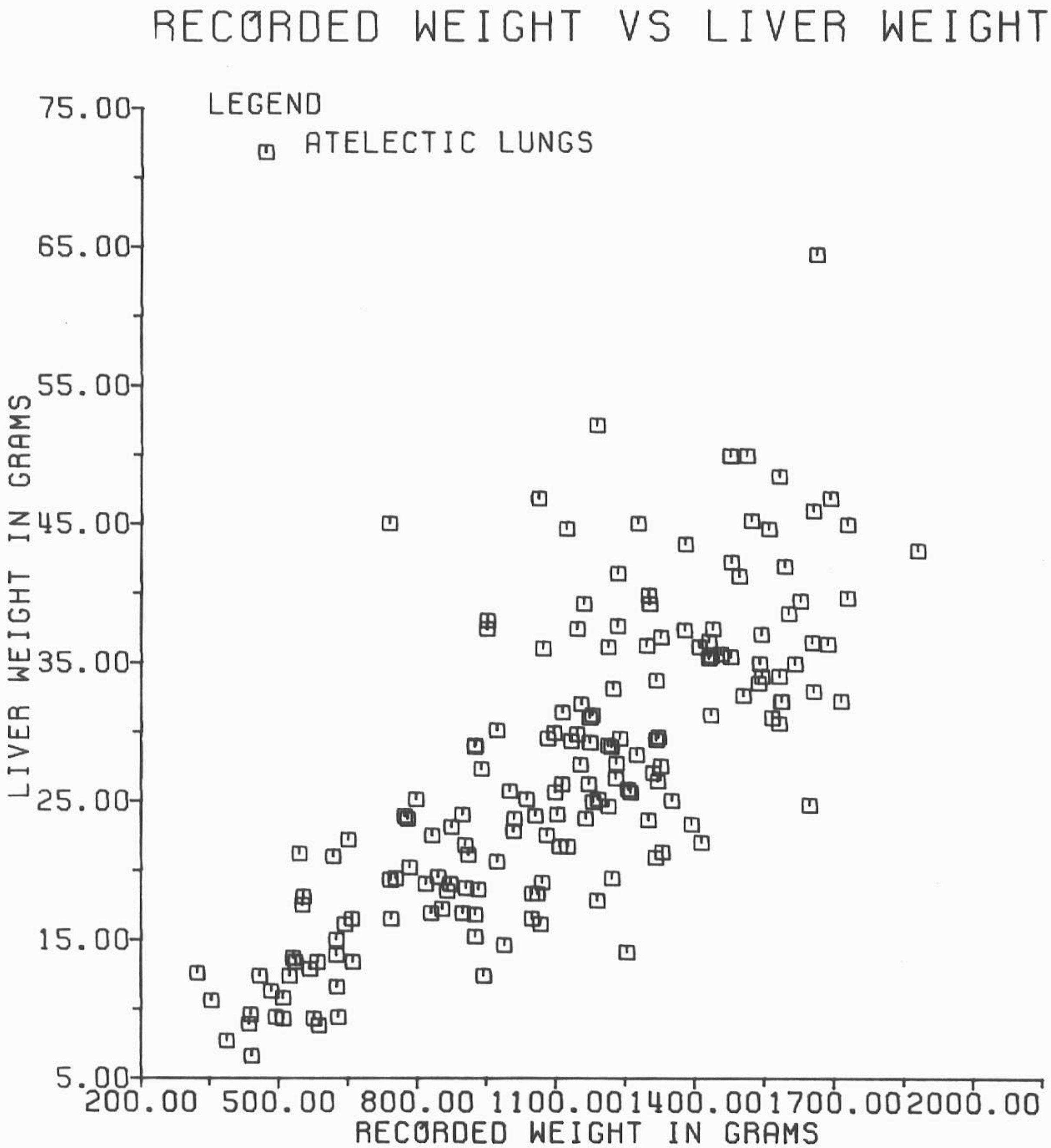
Graph 3. This correlation was statistically significant at the 0.01 level.



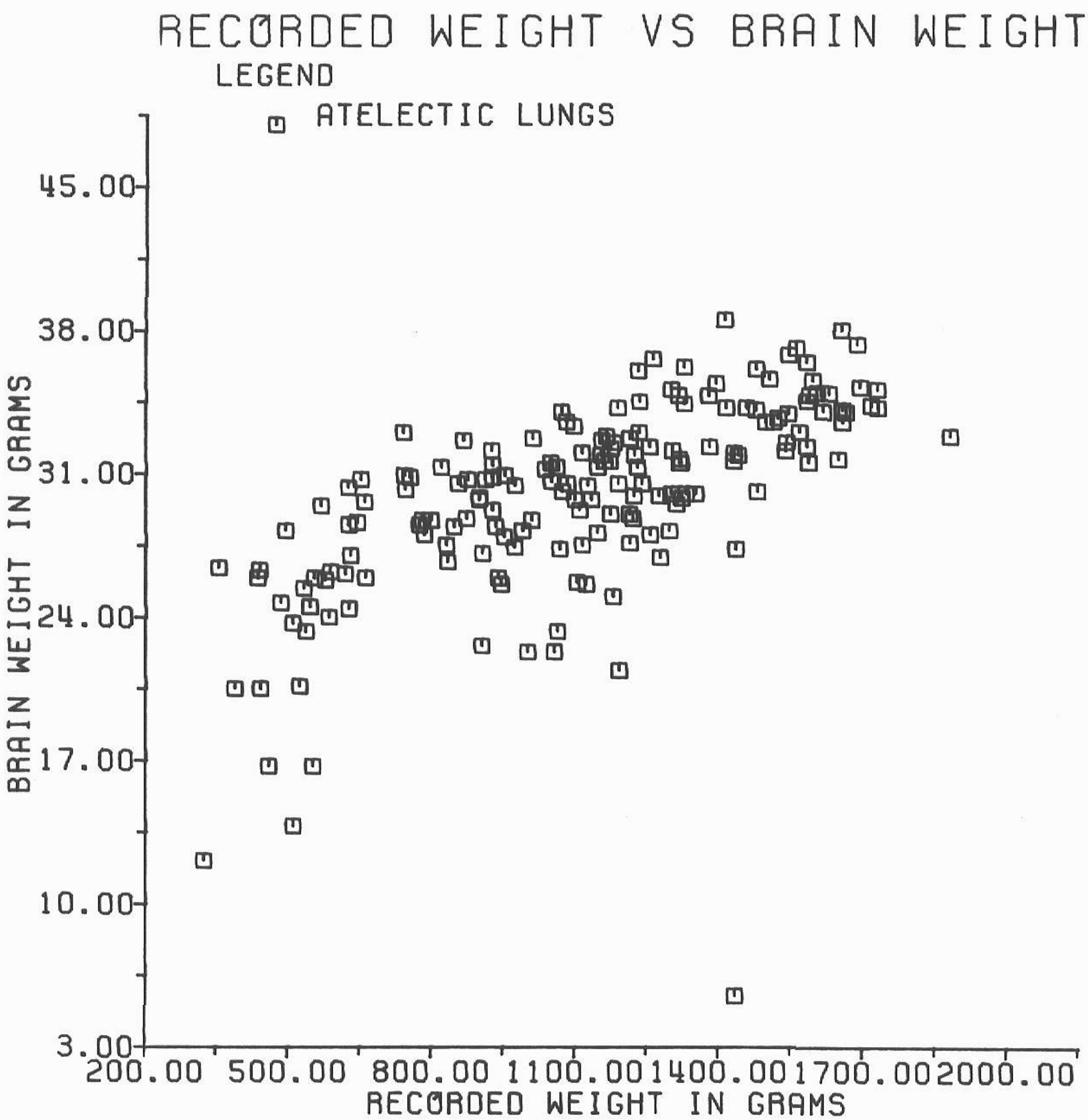
Graph 4. This correlation was statistically significant at the 0.01 level.



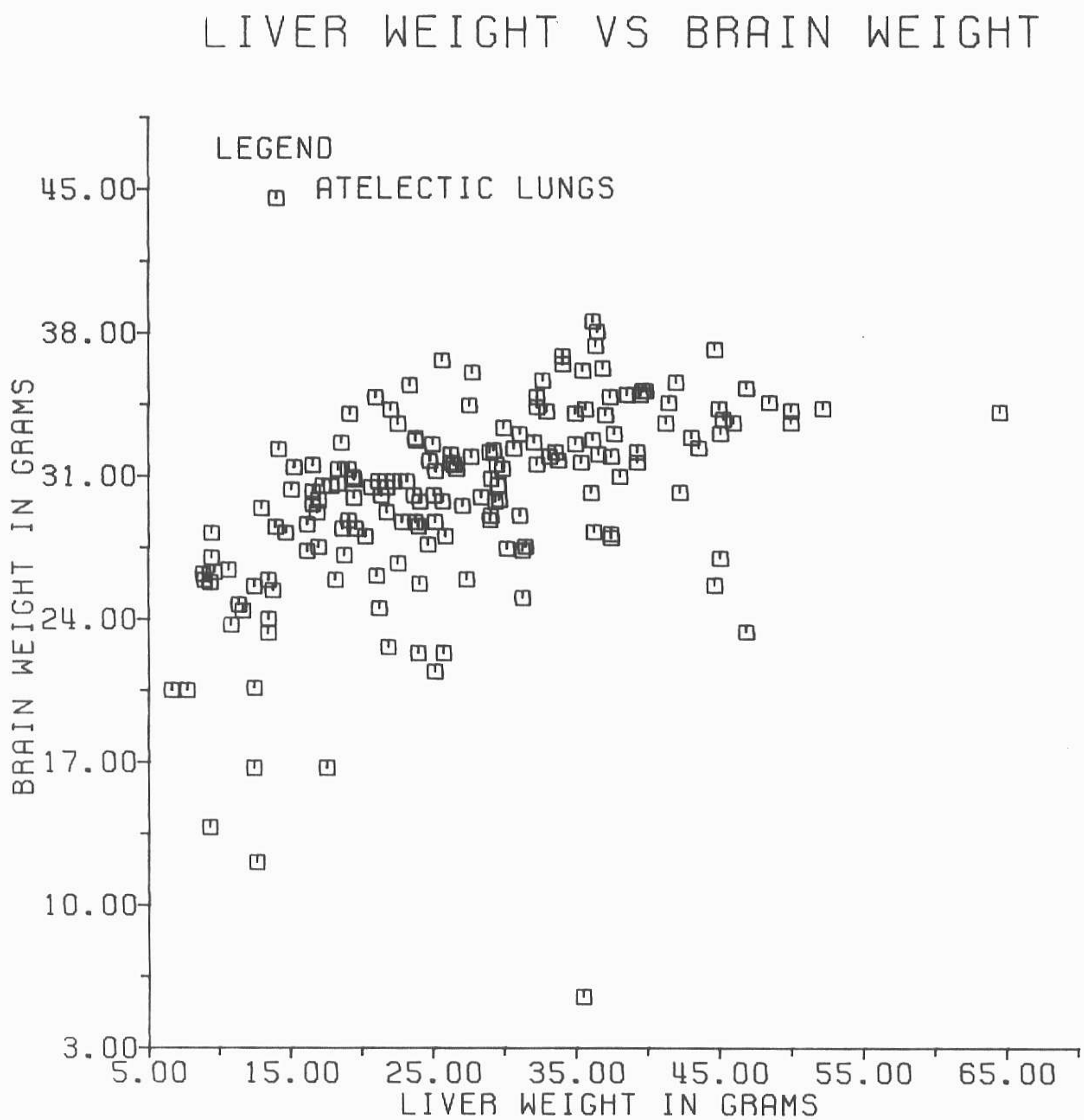
Graph 5. This correlation was statistically significant at the 0.01 level.



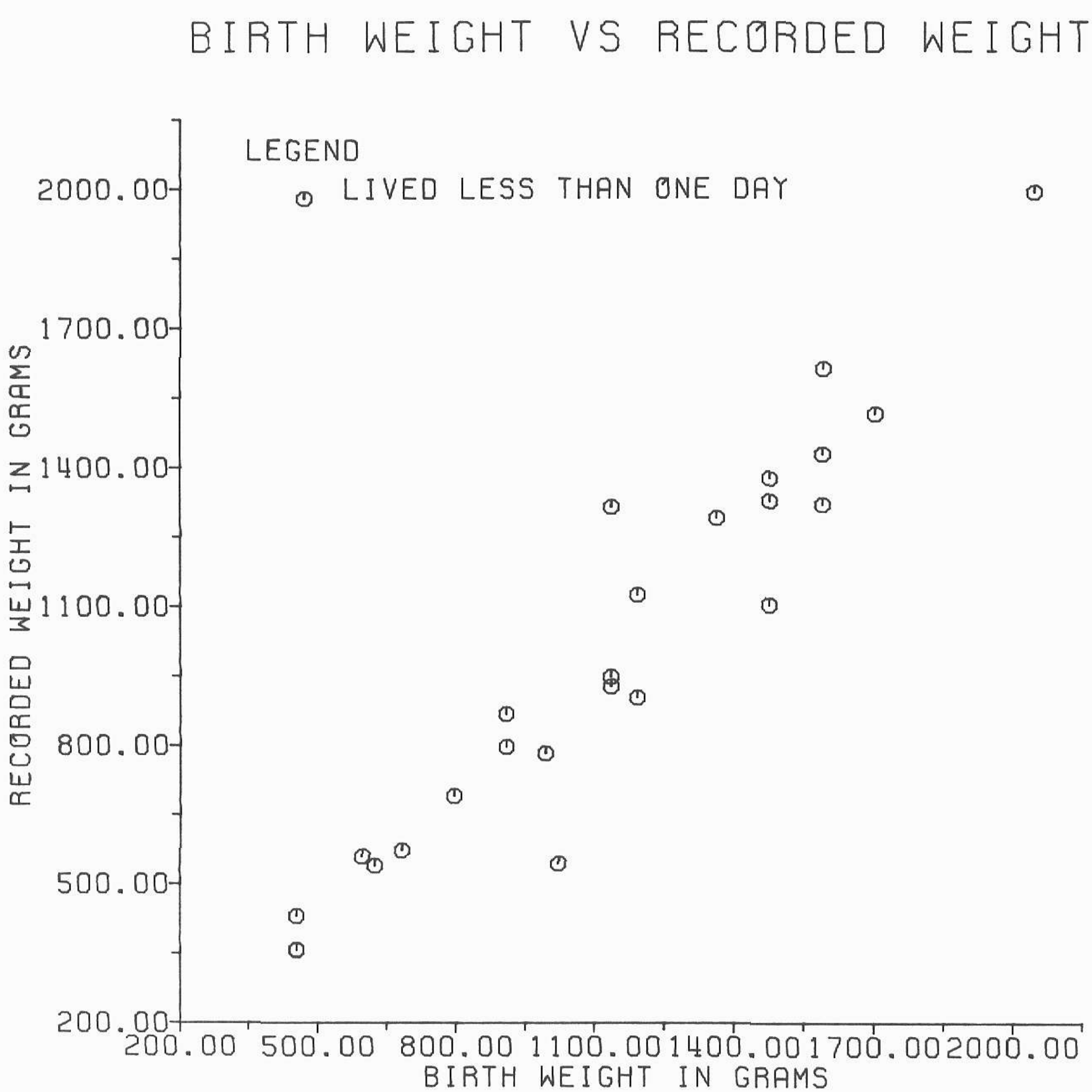
Graph 6. This correlation was statistically significant at the 0.01 level.



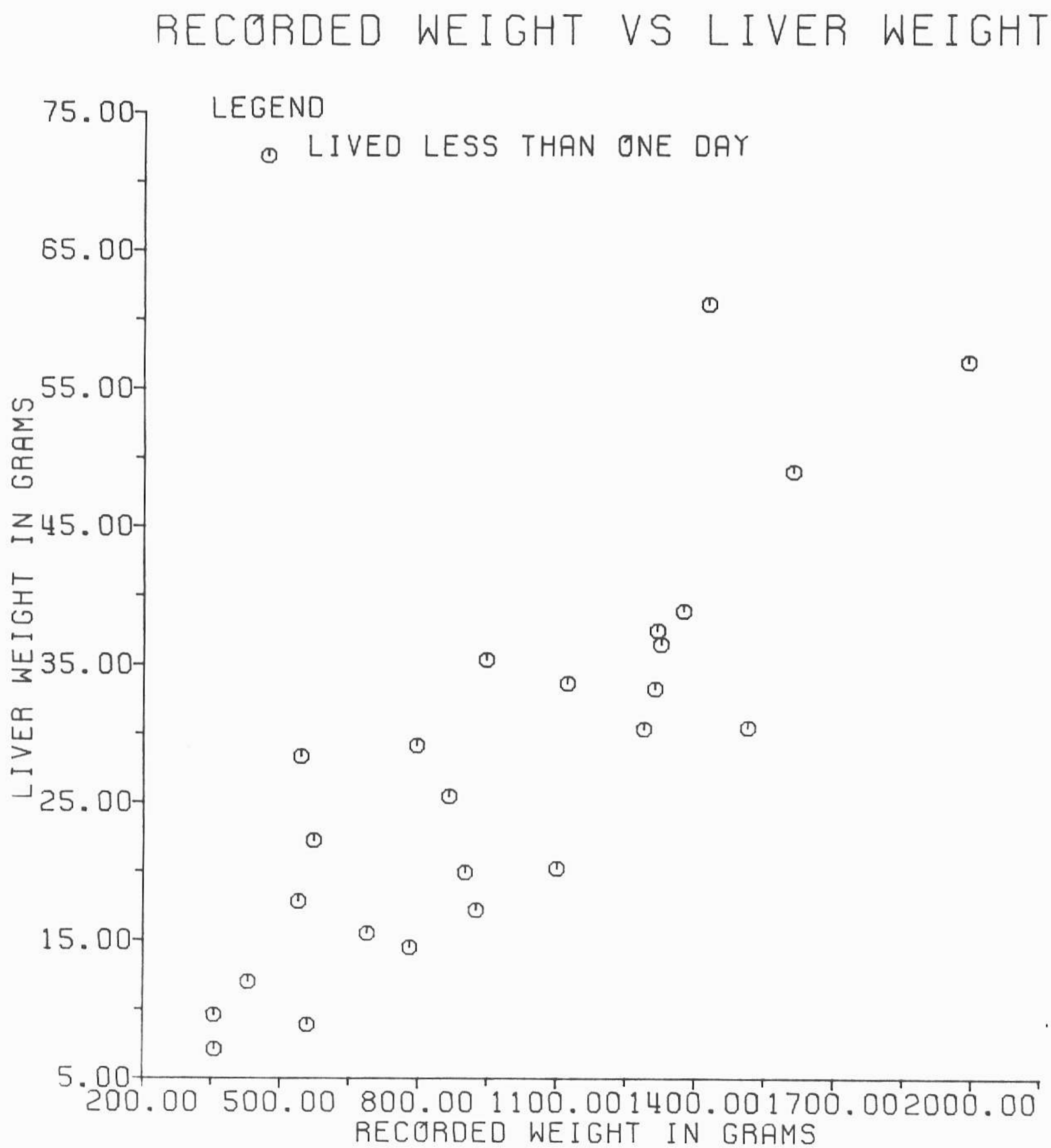
Graph 7. This correlation was statistically significant at the 0.01 level.



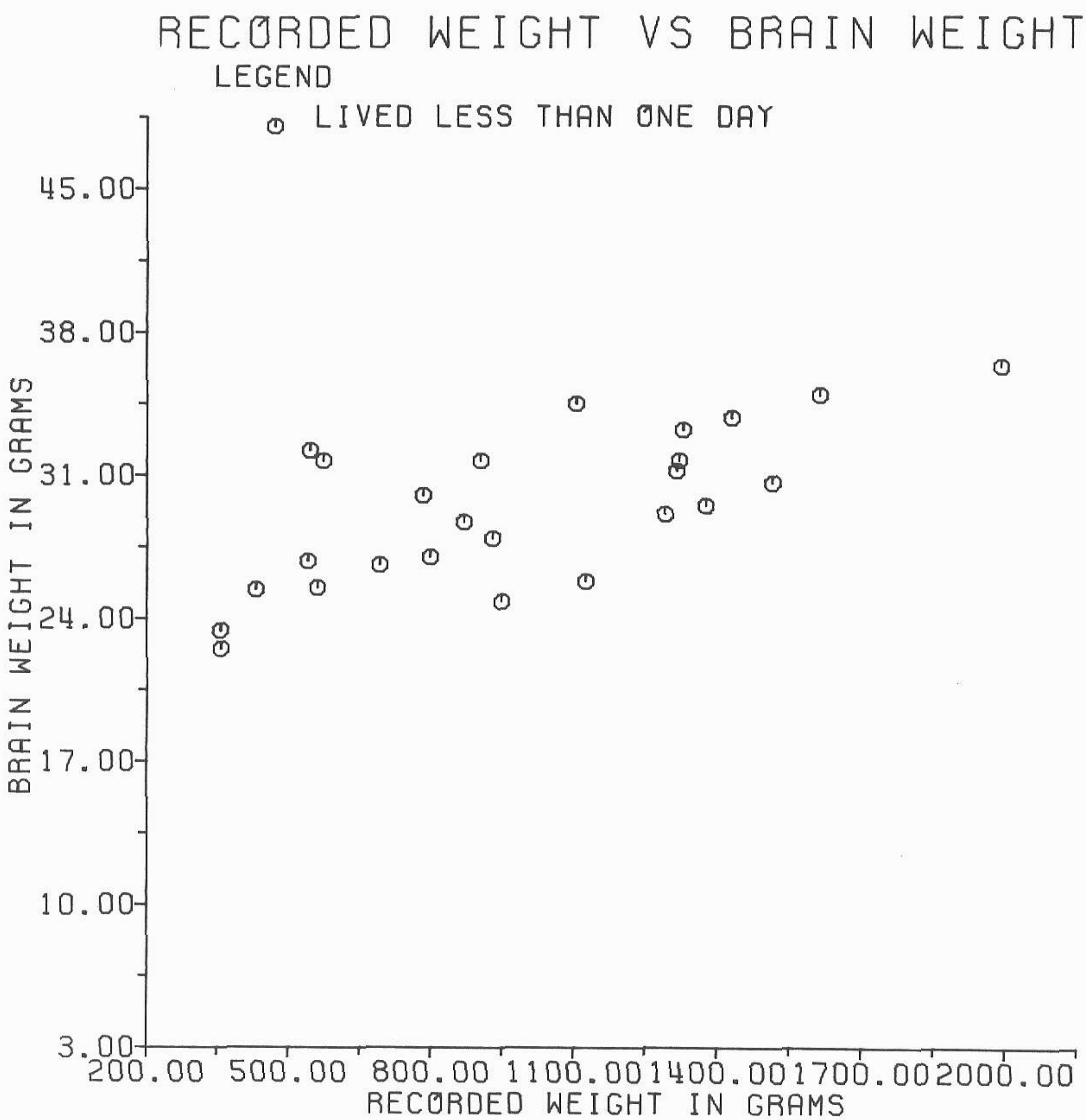
Graph 8. This correlation was statistically significant at the 0.01 level.



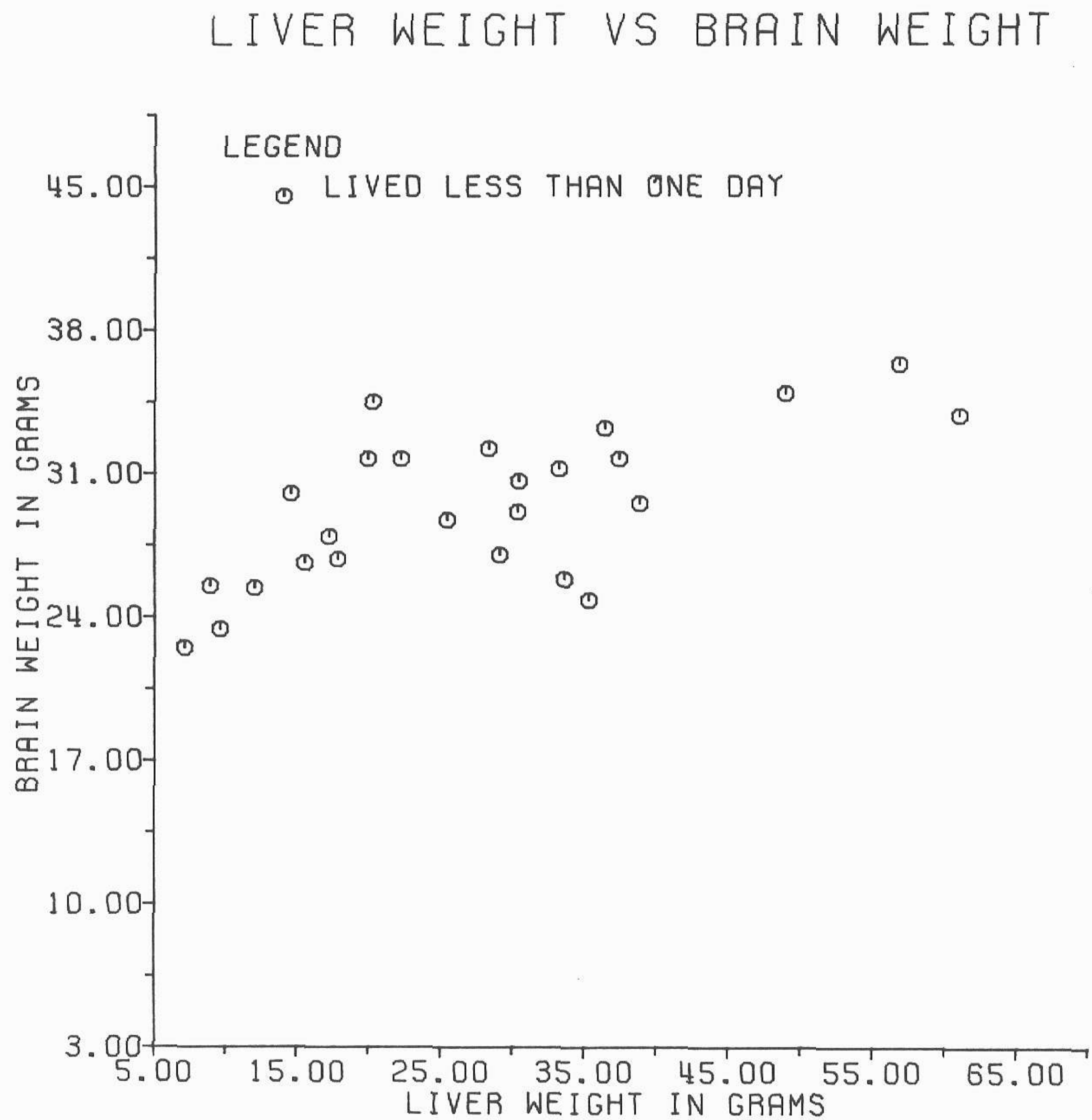
Graph 9. This correlation was statistically significant at the 0.01 level.



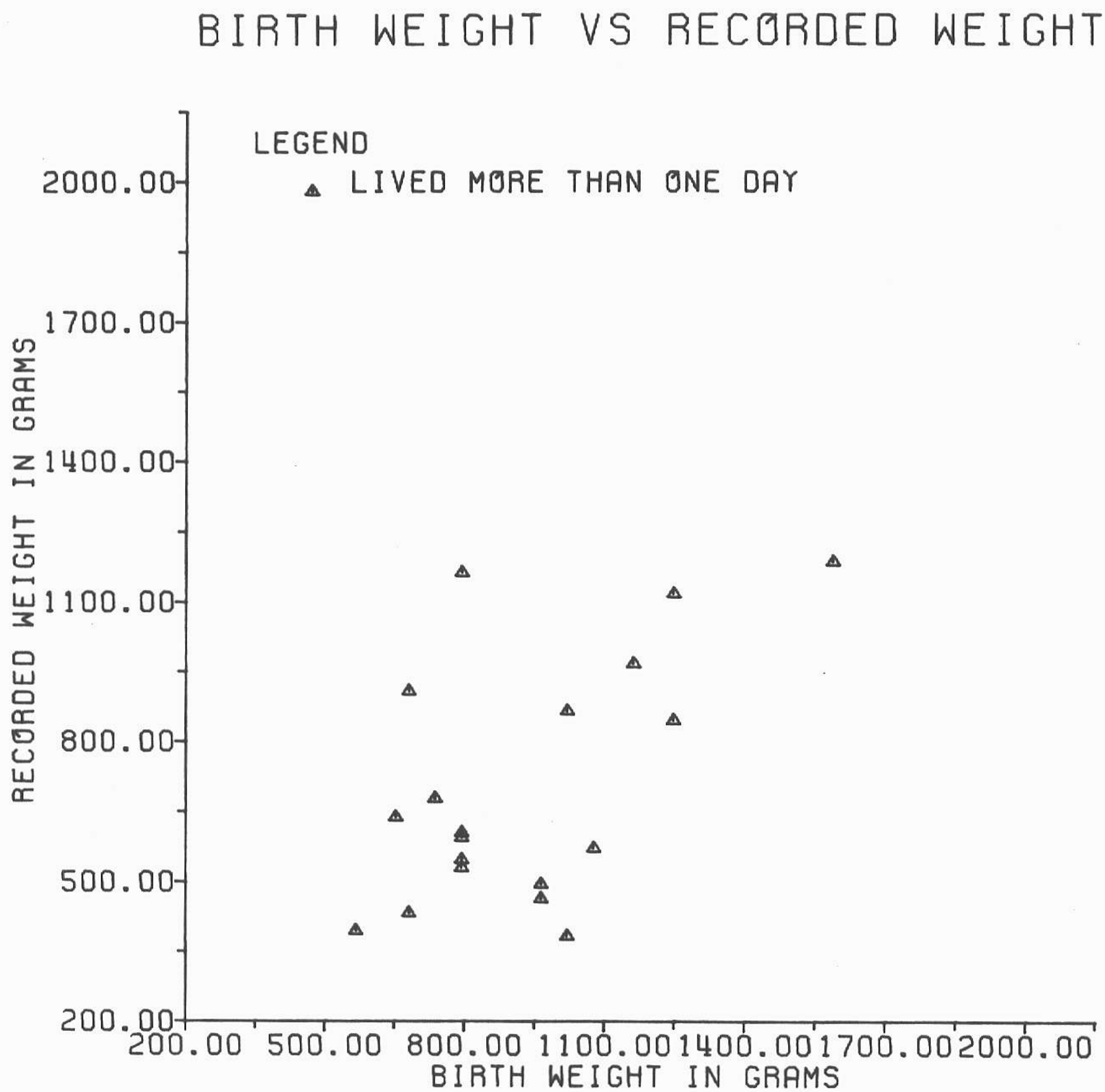
Graph 10. This correlation was statistically significant at the 0.01 level.



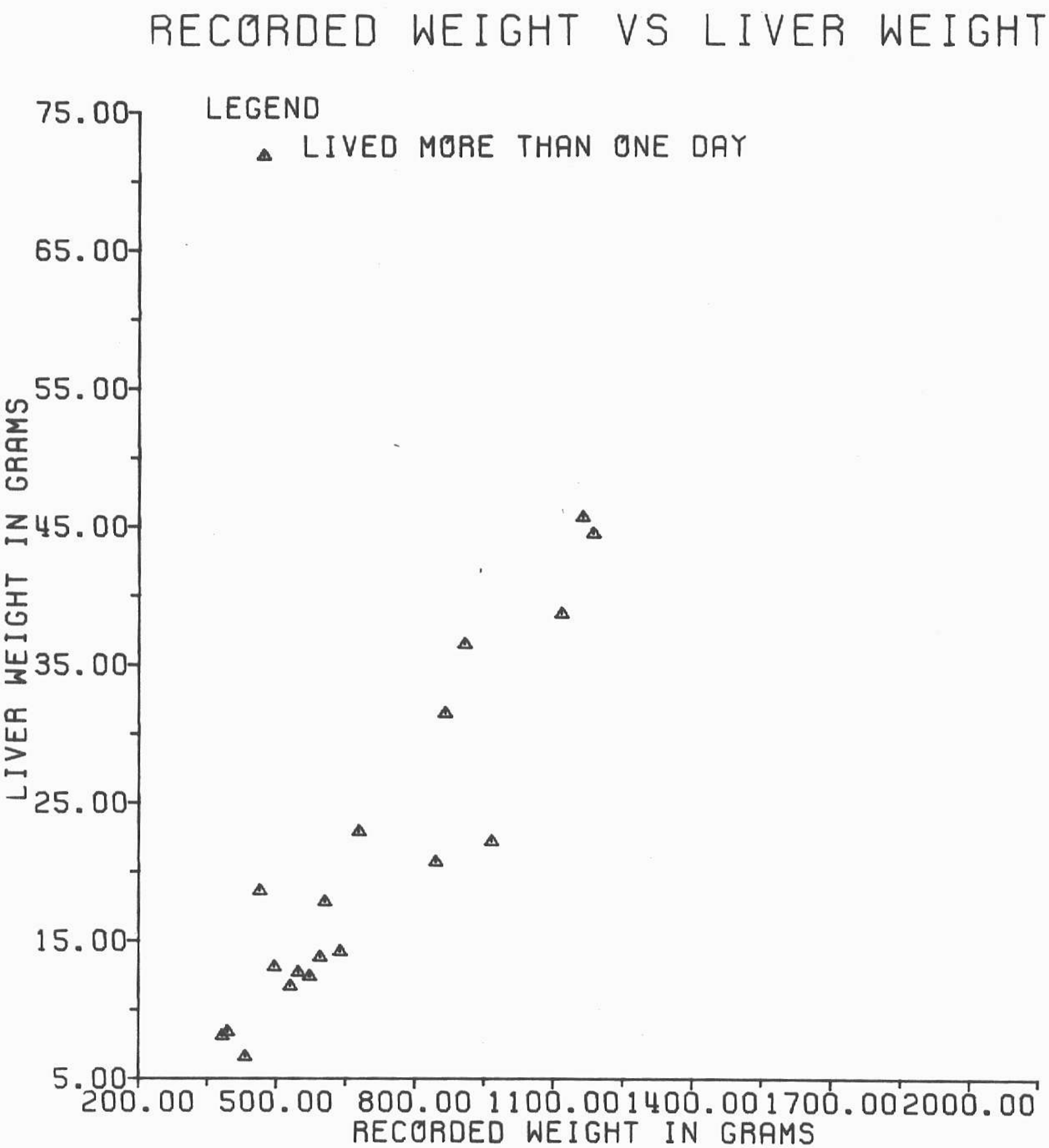
Graph 11. This correlation was statistically significant at the 0.01 level.



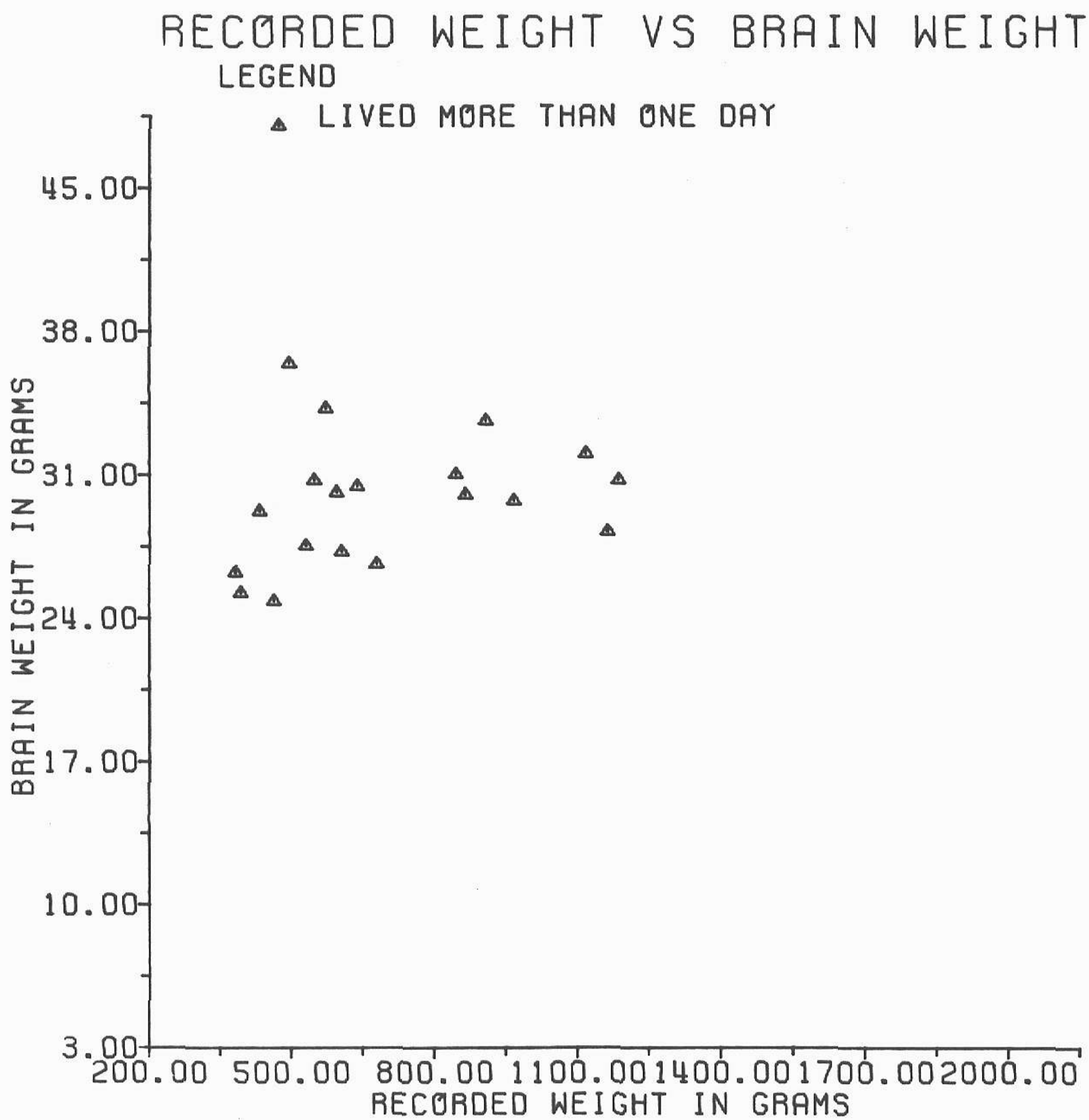
Graph 12. This correlation was statistically significant at the 0.01 level.



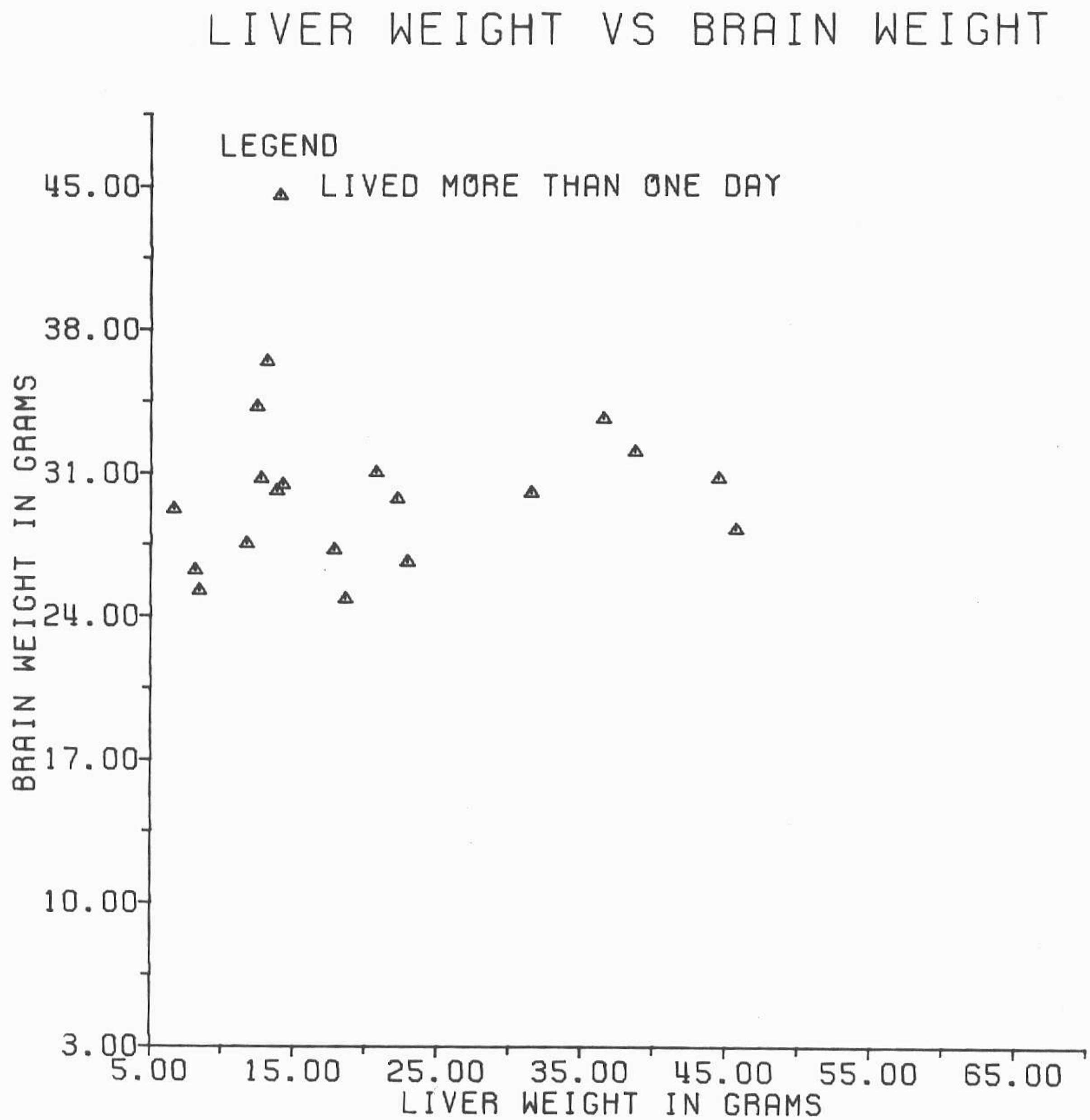
Graph 13. This correlation was statistically significant at the 0.05 level.



Graph 14. This correlation was statistically significant at the 0.01 level.



Graph 15. These values were not significantly correlated.



Graph 16. These values were not significantly correlated.

FIGURES

Figure A. A lateral radiograph of a normal piglet.

Figure B. A lateral radiograph of the hydrocephalic piglet.

Figure C. A ventral-dorsal radiograph of the hydrocephalic piglet.

Figure D. A lateral radiograph of the piglet with an encephalocele.

Figure E. A ventral-dorsal radiograph of the piglet with an encephalocele.

Figure F. A lateral radiograph of the piglet with perosomus elumbis. The associated defects were horseshoe kidney, perosomus acaudatus, atresia ani, atresia coli, and muscular atrophy of the hindlegs.

Figure G. A lateral radiograph of conjoined twins. Associated defects were conjoined liver, conjoined jyunum, and conjoined cecum.

Figure H. A lateral radiograph of a piglet with facial hypoplasia. Notice the shortened maxilla.

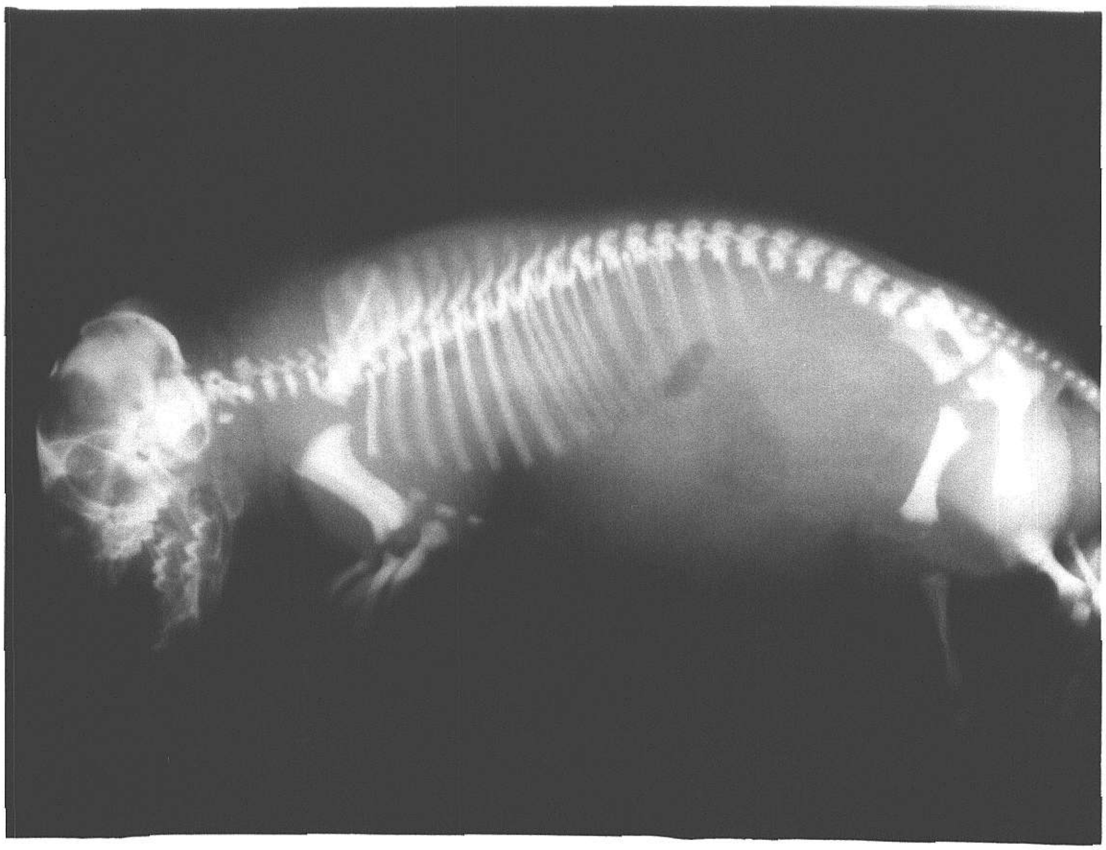


Figure I. Facial hypoplasia in a piglet (lateral radiograph).

Figure J. A lateral radiograph of a piglet with facial hypoplasia.

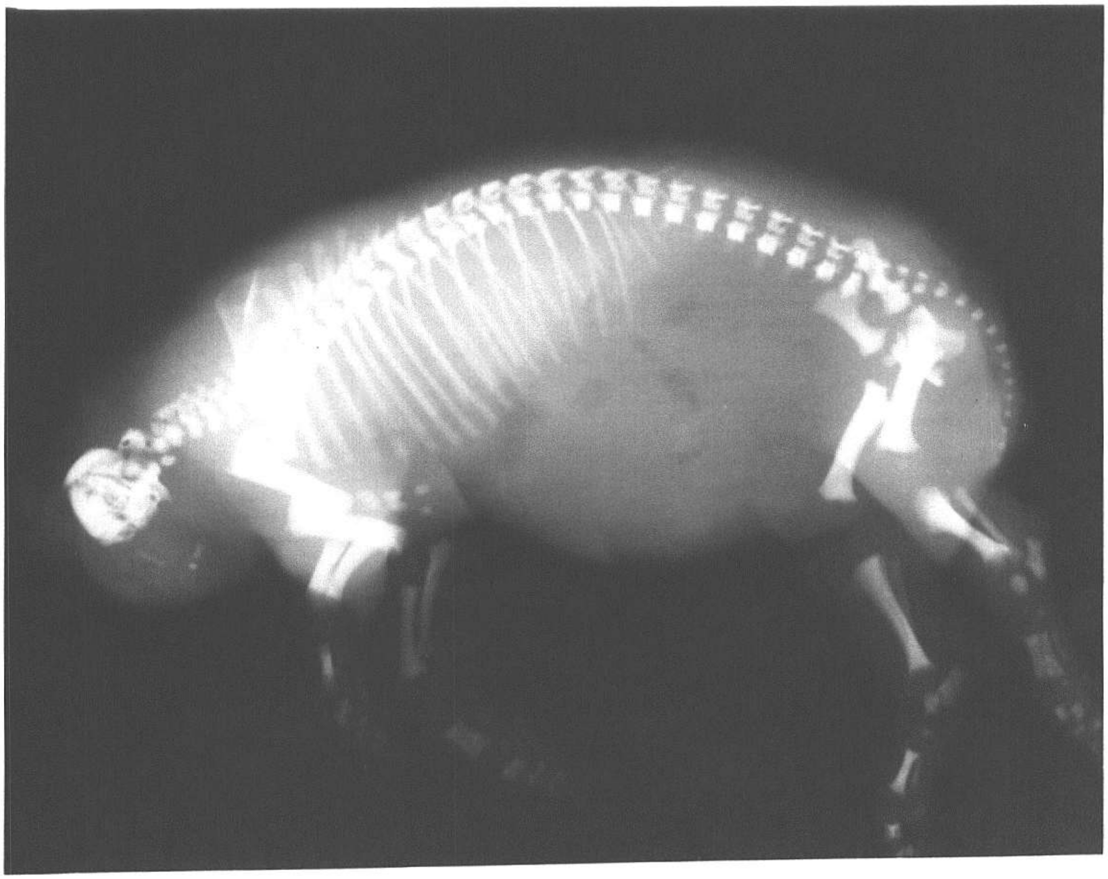


Figure K. A lateral radiograph of the piglet with facial aplasia (aprosopia).

Figure L. A composite ventral-dorsal radiograph of (a) the aprosopia piglet, (b) a facial hypoplasia piglet, and (c) a normal piglet.

Figure M. (TOP) A lateral view of the piglet with astomia and a rudimentary mandible (agnathia).

Figure N. (BOTTOM) A ventral view of the same piglet.

Figure 0. A lateral radiograph of the piglet with astomia and agnathia.

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The author wishes to thank Dr. H.W. Leipold for his ever-present optimism and his generously given advice throughout this study.

Appreciation is also given to Mr. David Culp, statistician, for his help in setting up the computer programs and analyzing the results obtained in the study.

Special thanks are given to Mr. John Abboud for supplying the material for this study.

Gratitude is also expressed to the author's husband for his continued support and understanding.

A SURVEY OF PERINATAL MORTALITY IN A SWINE HERD

by

JOAN ELLEN WHITE JOHNSON

B.S., Kansas State University, 1973
D.V.M., Kansas State University, 1976

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Pathology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Many factors seem to be involved in the cause of perinatal mortality in piglets. This study was involved with the factors of the sex of the piglet; of the differences of being born of a sow versus a gilt; of the portion of the litter a piglet was born-- the first, the middle or the last; of the influences of injecting posterior pituitary oxytocin; of the chances evident in body weight, liver weight, and brain weight; and of the congenital defects found in the litters containing a stillborn piglet, a mummy, or a piglet that died a few days after birth.

One thousand-seven hundred-three piglets were examined using record cards kept by the owner of a large pig farm in Southeastern Kansas. Of these piglets, 234 were transported from this farm in a frozen state to Kansas State University where they were thawed and a standardized necropsy was performed. Body weights, liver weights, and brain weights were recorded as was any congenital defect found.

The farrowing interval in this herd was not statistically significant in the determination of the status of the piglet at birth (alive, dead, or a mummy).

Sex of the piglet was not statistically significant in the determination if a piglet was born dead, alive, or a mummy.

Whether the dam was a sow or a gilt was slightly significant, with the gilt being more likely to have a stillborn piglet.

There was a definite relationship between a piglet born dead and in which third of the litter it was born. The last third of the litter was more likely to contain a stillborn piglet.

If the dam was given an injection of posterior pituitary oxytocin, the piglet after the injection was more likely to be born dead. If the piglet was born just after the injection in the last third of the litter, it had a 20% chance of being born alive.

There were 218 piglets examined as to body weight at birth, body weight at necropsy, liver weight, and brain weight. The less the piglet weighed, the greater the probability that the piglet would be born dead (either stillborn or a mummy).

In the groups, atelectic lungs and lived less than one day (the lungs were only partially expanded), the birth weight, recorded weight at necropsy, the liver weight, and the brain weight were all highly correlated at the 0.01 level. In the lived more than one day group, the birth weight-brain weight, recorded weight-brain weight, liver weight-brain weight, and liver weight-birth weight were not significantly correlated. The recorded weight-birth weight were correlated at the 0.05 level and the recorded weight-liver weight were highly correlated at the 0.01 level.

Forty-two piglets were found to have at least on congenital defect and 7 had multiple defects. Many of these were considered inheritable.