DISTOCIA EM PORCAS HIPERPROLÍFICAS: UMA REVISÃO

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RESUMO

A seleção genética para a hiperprolificidade na suinocultura trouxe benefícios significativos, como o aumento do número de leitões nascidos, mas também apresentou desafios, incluindo o aumento dos casos de distocia. A distocia, caracterizada por complicações durante o parto, resulta em maior duração do processo e representa riscos tanto para as porcas quanto para os leitões. Embora a incidência de distocia seja geralmente baixa, há uma variabilidade considerável na literatura sobre o que define um parto eutócico e um parto distócico, especialmente no contexto de melhorias genéticas constantes que influenciam as características das fêmeas e de suas leitegadas. Objetivou-se com esta revisão explorar as causas que levam à ocorrência de partos distócicos em porcas hiperprolíficas, bem como abordar estratégias de prevenção, intervenção e suas implicações no desempenho produtivo.

Palavras-chave: Parto, Intervenção, Suíno, Reprodução

DYSTOCIA IN HYPERPROLIFIC SOWS: A REVIEW

ABSTRACT

Genetic selection for hyperprolificacy in swine production has brought significant benefits, such as increased litter sizes, but it has also introduced challenges, including a rise in dystocia cases. Dystocia, characterized by complications during labor, leads to prolonged delivery times and poses risks to both sows and piglets. Although the incidence of dystocia is generally low, there is considerable variability in the literature regarding what defines a eutocic (normal) versus a dystocic (complicated) birth, particularly in the context of ever-evolving genetic improvements that influence sow and litter traits. This review aims to delve into the causes of dystocia in hyperprolific sows, explore preventive and intervention strategies, and assess its implications on productive performance.

Key-Words: Parturition, Intervention, Swine, Reproduction

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DISTOCIA EN CERDAS HIPERPROLIFICAS: UNA REVISIÓN

RESUMEN

La selección genética para la hiperprolificidad en la producción porcina ha traído beneficios significativos, como el aumento en el número de lechones nacidos, pero también ha presentado desafíos, incluyendo un aumento en los casos de distocia. La distocia, caracterizada por complicaciones durante el parto, resulta en una mayor duración del proceso y representa riesgos tanto para las cerdas como para los lechones. Aunque la incidencia de distocia generalmente es baja, existe una considerable variabilidad en la literatura sobre lo que define un parto eutócico y un parto distócico, especialmente en el contexto de las mejoras genéticas constantes que influyen en las características de las cerdas y sus camadas. El objetivo de esta revisión fue explorar las causas que llevan a la ocurrencia de partos distócicos en cerdas hiperprolíficas, así como abordar estrategias de prevención, intervención y sus implicaciones en el rendimiento productivo.

Palabras clave: Nacimiento, Intervención, Cerdo, Reproducción

INTRODUCTION

The genetic selection for increased litter size has led to the development of increasingly hyperprolific sows, which negatively impacts farrowing duration—a key factor associated with dystocia (1). Prolonged farrowing is linked to a greater likelihood of retained fetal membranes, resulting in a subsequent decline in reproductive performance (2,3). Furthermore, extended farrowing duration adversely affects piglets, as it increases the incidence of hypoxia, which can contribute to higher stillbirth rates (4) or reduced vitality in piglets born alive (5,6).

Farrowing duration is directly linked to the number of stillborn piglets (3,7,8), and can be, on average, between 156 and 262 minutes (4). Some authors reported that farrowing duration can range from 166 min (7) to 343 min (9). More recently, was considered that a 240 to 300 min is the ideal duration to Landrace x Yorkshire hybrid sows (10). In general, farrowings lasting more than 300 minutes are considered prolonged, significantly increasing the risk of stillbirths within the litter. This is primarily attributed to anoxia caused by placental abruption and umbilical cord rupture (4,8,11). Variation in farrowing duration is expected in hyperprolific sows, as these females must deliver a larger number of fetuses, which can elevate dystocia rates from 0.25% to 5% (1,12).

Studies has determined that the stillbirth rate increases from 2.4% to 10.5% when the duration of farrowing increases from 3 to 8 hours (13). Sows with a farrowing duration of more than 300 minutes had an average of 1.4 ±1.8 stillborn piglets, while sows with a farrowing duration of less than 300 minutes had 0.4 ±0.8 stillborn piglets (4). The farrowing duration increased from 307 ±141 min to 696 ±548 min when the number of stillborn went from 0 to 5 (3).

In addition to its direct connection to prolonged births, which leads to both productive and reproductive losses, dystocia can also cause economic damage to the production system. This occurs due to increased drug use, the need for more labor, and, in some cases, the death of piglets and sows. The objective of this review was to explore the causes for triggering dystocic births in hyperprolific sows, as well as prevention and intervention methods, and implications for reproductive performance.

MATERIAL AND METHODS

This review was carried out through bibliographical research, seeking to elucidate concepts about the physiology of parturition and identify possible obstacles in the management of pregnant and parturient sows that may influence the occurrence of dystocia.

As a research source for the review, complete articles published in indexed journals and books were considered. Specifically for the topic of intervention methods, case studies were considered, as some obstetric procedures are still rarely implemented in swine farming and there is not much literature on the subject. The research was conducted using the platforms Google Scholar, Scielo, and ScienceDirect, using combinations of the keywords "sow", “dystocia”, “farrowing”, “parturition”, and “piglet”.

PHYSIOLOGY OF PARTURITION

In order to understand dystocia, it is first necessary to comprehend what constitutes a normal and ideal birth for the swine species. This is because, as pointed out (12), despite the incidence of dystocia being considered low in swine farming (14) there is a discrepancy in the literature and in the field regarding what is considered a eutocic (normal) birth and a dystocic (difficult) birth.

The onset of farrowing is triggered by the fetus through hormonal changes in the sow’s body (15). In pigs, the corpus luteum plays a crucial role in maintaining pregnancy, and its regression at the end of gestation is induced by Prostaglandin F2α (PGF2α) via the adenyl cyclase system, which inhibits progesterone secretion (15,16). Approximately 24 hours before farrowing, the maturation of the hypothalamic-pituitary-adrenal axis increases fetal cortisol levels, which are then transported to the placenta (17). This leads to an increase in mucus secretion in the sow's reproductive tract, aiding in the lubrication and cleansing of the birth canal, while progesterone blockage in the myometrium is lifted (18).

The removal of the progesterone block occurs due to both the conversion of progesterone to estrogen and luteolysis driven by placental PGF2α (16,18). Farrowing is characterized by a gradual increase in estrogen levels in the final weeks of pregnancy, a sharp decline in progesterone, and a rise in PGF2α within 48 to 24 hours before the onset of delivery (19). As estrogen and PGF2α levels rise, the myometrium becomes more active, initiating uterine contractions (18,19). Relaxin, produced by the corpus luteum from day 28 of gestation, is released two days before parturition under the influence of PGF2α (16). Myometrial contractions create pressure that stimulates neurons in the cervix, signaling the hypothalamus to produce oxytocin.

Oxytocin levels peak between 9 and 4 hours before the birth of the first piglet, reaching their highest levels during the delivery of subsequent piglets (20). Thus, increased uterine prostaglandin production, which enters maternal circulation, plays a key role in initiating labor, with oxytocin enhancing the existing contractions (21).

Thus, a eutocic birth can be defined as one in which there is expulsion of fetuses and placentas without the need for obstetric intervention (12).

DYSTOCIA

Dystocia is regarded as the most significant health disorder that can occur during farrowing, as it is relatively uncommon in swine species (22). It can be classified as originating from either maternal or fetal causes. A dystocic birth occurs when the sow is unable to initiate or complete the farrowing process, resulting in a slow or difficult parturition (12,15). Contributing factors include abnormal presentation of piglets in the birth canal, uterine torsion,

or oversized piglets (2). The criteria for defining dystocia vary; some authors propose using inter-piglet intervals (13,22,23), while others focus on the total duration of farrowing (4). However, a universally accepted definition has not yet been established.

Dystocia of maternal origin

Maternal dystocia can arise from anatomical changes in the sow, such as vulvar, vaginal, or cervical anomalies, or from complications during parturition, including uterine atony, hypertonicity, torsion, or prolapse. It is important to note that anatomical anomalies are rare in swine, largely due to the intense genetic selection applied to sows.

Uterine atony is the state of non-contraction of the myometrium during parturition. It can be classified as primary, when contractions do not begin even after signs of beginning of labor, or secondary, when exhaustion of the uterus muscles occurs (24). Both primary and secondary uterine atony may occur as secondary complications of fetal-origin dystocia. Primary atony can arise when insufficient fetal stimulation fails to trigger abdominal contractions, such as in cases of fetal death or very small fetuses. In contrast, secondary atony is commonly observed in situations involving fetal static issues, where contractions occur but fail to expel piglets due to physical blockage in the birth canal, such as improper positioning or even the large number of piglets born, ultimately leading to maternal exhaustion (24). According to (14), approximately 37% of maternal-origin dystocia cases are attributed to uterine atony.

Uterine hypertonicity, the opposite process, can also occur. This type of dystocia is most commonly described in mares, and according to (25), it can lead to fetal hypoxia, uterine rupture or prolapse, soft tissue lacerations, among other consequences. Although less common in pig farming, uterine hypertonicity can occur, particularly due to the improper use of contraction-inducing agents such as oxytocin or the similar molecule carbetocin.

Vaginal, cervical, uterine and rectal prolapses may occur during peripartum. The concept of uterine prolapse was defined as the movement and externalization of the organ through the vulvar lips, which may occur before, during or after parturition, and in the first two cases may make it impossible to expel the piglets (25). The possible causes of prolapses are diverse, such as, for example, the action of mycotoxins (26), uterine hypertonicity (14) and, as described by (27), there is also a genetic predisposition. The occurrence of a prolapse before the time of delivery can prevent the expulsion of fetuses, leading to higher stillbirth rates. When it happens afterward, prolapses may cause reproductive losses and affect the sow's longevity. In severe cases, it can result in death (28).

Finally, uterine torsion is more frequently observed in ruminants due to their anatomical characteristics and may be related to factors such as increased muscle and ligament flaccidity, transport, and asymmetry between the uterine horns, among others (25). According to the author, the prognosis depends on the degree of torsion.

Dystocia of fetal origin

Dystocia of fetal origin can or cannot be related to fetal statics. Fetal statics refers to the positioning of the fetus inside the uterus, and alterations in this positioning can cause dystocia. Fetal statics is defined by three parameters: presentation, position, and attitude (25). Presentation refers to the relationship between the longitudinal axes of the fetus and the female. Anterior (cephalic) presentation occurs when the forelimbs emerge first, and posterior (breech) presentation occurs when the fetal hind limbs face the birth canal. Position refers to the relationship between the dorsal part of the fetus and the maternal region with which the back is in contact. Finally, attitude refers to the relationship between the mobile parts of the fetus, that is, the relationship of its limbs and head to its body.

In a eutocic birth, an anterior longitudinal presentation, cervico-sacral (upper) position, and extended attitude are expected (25). However, in swine, posterior presentations are quite common and not considered a dystocia itself. Although (29) reported no difference in the progression of labor for fetuses in anterior or posterior presentation. It was demonstrated that piglets in posterior presentation have a longer birth interval compared to those in anterior presentation (7). Additionally, a greater number of fetuses in anterior presentation is associated with sows spending more time lying down during labor, which is considered an advantage in terms of ease of delivery (30).

There is also dystocia of fetal origin independent of static, such as fetal deformities, relative or absolute large fetus, umbilical cord anomalies, and resistance of fetal membranes. Congenital defects are quite uncommon; they can include conditions such as arthrogryposis, hyperostosis, hydrocephalus, conjoined piglets, schistosoma reflexa, syndactyly, polydactyly, and micromelia (14).

How and when to intervene

Knowing the herd, especially the genetics and background of each sow, is essential to identify dystocia and the correct form of intervention. In general, interventions can be carried out mechanically or pharmacologically.

In general, uterine atony is managed through the use of ecbolic agents (oxytocin, prostaglandins, and ergot analogs) or by stimulating the release of endogenous oxytocin through abdominal massages and teat suction caused by piglets during nursing. In more severe cases, it is possible to combine these with the administration of calcium, which aids in contractions, and glucose, as an energy source (31). Otherwise, in the case of uterine hypertonicity, an uncommon process in pig farming, it is recommended to use tocolytics or sedatives.

In cases of uterine torsion, it is possible to attempt correction through non-surgical maneuvers, such as rolling the sow in the opposite direction or vaginal palpation. However, laparotomy and cesarean section generally become necessary. Reported successful cesarean outcomes in pigs when the decision for surgery was not delayed, with 86.6% of the females surviving when the procedure was performed within 18 hours of labor onset (32).

It is important to note that the surgical procedures in the referenced study were conducted with anesthesia and the presence of a veterinarian, which differs from the reality of procedures in Brazilian farms. Lozier et al (33) evaluated complications in 110 cesarean cases, finding complications in only 38.45%, including incisional seroma, lethargy, and anorexia. Furthermore, 33 of the evaluated sows became pregnant again in the future, with 13 of these (39.4%) experiencing normal deliveries in their subsequent gestation. The authors associated cesarean section with a good prognosis.

According to (34), hysterectomy cases — a procedure differing from cesarean as it involves the removal of the uterus without the intent of reintegration, usually performed in swine production with euthanasia as the objective — can only be performed after the induction of unconsciousness. However, most available literature on the subject pertains to pigs used in biomedical research rather than in-field applications, highlighting the need for studies on the applicability of the procedure in farm settings. Cesarean section may be necessary not only in cases of torsion but also in other dystocias.

In the case of uterine, cervical or vaginal prolapse, intervention will depend on whether it occurred before or after birth. When it occurs before the birth of piglets, the most commonly used intervention is a cesarean section, as there is a total distortion of the anatomy of the birth canal. When prolapse occurs after birth, treatment can be carried out by reducing the structure followed by a Bühner suture or by total uterine removal via the perineal route (25). There are case reports in the literature of successful prolapse reduction, such as the one described by (35),

where a sow presented with vaginal prolapse resulting from uterine torsion. In general, when this maneuver is performed, it is recommended to cull the sow after the piglets have been weaned.

Finally, in cases of dystocia of fetal origin, correction can be performed through obstetric maneuvers. Due to the relative size of the piglets in relation to the sow's uterus, obstetric maneuvers to correct fetal statics are performed with less difficulty than in uniparous species (36)

Implications on productive performance

Reproductive disorders are the main cause of culling of sows in the herd, mainly because of the repeating breeding rate, accounting from 34% to 35.3% of the total number of removed sows (2,37). Among reproductive disorders, dystocia is the main cause of culling in primiparous females, accounting for up to 40% of culls, a significantly higher rate than culls due to dystocia in other parities (37). In addition, according to Paiva (38), besides sudden deaths, prolapses have been responsible for the significant increase in sow mortality over the past few years.

Furthermore, an important point to be considered in the management of dystocia is pain. Parturition, in itself, is proven to be a painful event for mammals, and when associated with dystocia, can represent a welfare concern (36).

CONCLUSION

Genetic selection targeting hyperprolificacy in sows has, as a consequence, increased the occurrence of dystocia, often characterized by prolonged labor. Therefore, understanding dystocia is crucial for its identification, prevention, and intervention to minimize production losses.

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