GM 13. NEONATAL WEAKNESS AND ITS SEQUELAE IN TROPICAL CROSSBRED CALVES

A. Landaeta[1], P. J. Chenoweth[3], O. Verde[2], J. M. Ferrer[1], M. Barboza, N. Soto and T. Moreno

[1]Facultad de Ciencias Veterinarias. La Universidad del Zulia. Maracaibo, Venezuela. [2]Facultad de Ciencias.Veterinarias. Universidad Central de Venezuela. Maracay, Venezuela. [3]College of Veterinary Medicine. University of Florida. Gainesville, USA. E-mail: antonio@rams.vetmed.ufl.edu

Resumen

Debilidad al nacer y sus secuelas en becerros mestizos tropicales

Aspectos relacionados a la incidencia de debilidad neonatal (DB), fueron analizados en 675 becerros producto de cruces dirigidos con 9 genotipos de razas lecheras y cárnicas. Los becerros fueron evaluados clínicamente entre el nacimiento y 24 h. La investigacián fue desarrollada entre los años 1990-1994 en una finca comercial ubicada en el Dto. Baralt- Zulia-Venezuela. La data fue analizada mediante distribución de frecuencias y Chi-cuadrado. Las variables analizadas fueron: condición clínica perinatal (CCP) en niveles bien (B), afectado (A) y mal (M); patologías perinatales (PP) (debilidad=DB, diarrea=D, onfalitis=O y ceguera=C); y mortalidad perinatal (MP); Efectos de raza paterna (RP) sobre la ocurrencia de DB y epoca de nacimiento (E) sobre CCP, PP y ocurrencia de DB. CCP se distribuyó en B (78.81 %), A (18.22 %) y M (1.32 %). DB (87.87 %) fue el mayor exponente de PP, seguida de D (6.81 %),), O (4.54%) y C (0.75%). MP fue 0.43 %. Se halló asociación estadística (P < .001) entre RP y DB, siendo Jersey (35.70 %), Holstein (26.10 %), Brahman rojo (25.60 %), Pardo Suizo (18.40 %) y Limousin (16.60 %) los genotipos con mayor incidencia. E no se hallo asociada a CCP ni a DB, pero se asoció (P < .05) a la incidencia de PP. Se concluye que la debilidad neonatal debe revisarse como principal predisponente de morbilidad y mortalidad, y que su relación con factores genéticos debe ser cuidadosamente analizada.

Palabras claves: Debilidad, becerros mestizos, genética, salud.
Key words: Weakness, crossbred calves, genetic, health.

Introduction

Neonatal morbity and mortality cause significant economic and genetic losses in cattle (Montoni y Rojas, 1992, Wittum *et al.*, 1994b). In India, 12.1 % of F1 crossbred dairy x *Bos indicus* calves were lost in the first 30 days, with a significant genotype effect (Singh *et al.*, 1989). In Venezuela, perinatal calf mortalities of 3.48 % and 5.50 % in the first 12 h are reported in Brahman (Montoni y Rojas, 1992, Plasse *et al.*, 1994). In the U.S., calf mortality of 2.50 % during the first 12 h. has been reported in *Bos taurus* (Wittum *et al.*, 1994a). Calf mortality in non-organized herds may often exceed 15 %. Although specific causes of calf loss are recognized, the greatest underlying cause is probably poor immunocompetence secondary to nutritional and environmental factors (Rea *et al.*, 1996). Inadequate perinatal colostrum intake is an important cause of poor immunocompetence and illness (Sttot *et al.*, 1979). Poor suckling ability of weak neonates may cause delayed, or inadequate colostrum intake. However, specific causes for calf losses are often not recognized, or simply categorized as unknown causes, maternity failures or starvation (Montoni y Rojas, 1992, Plasse *et al.*, 1994). In Brahman, 24 % of neonatal calf losses were attributed to weakness and low birth weight (Plasse *et al.*, 1994). Likewise, weak calves were 24.4 kg lighter (P < .01) at weaning than normal calves (Wittum *et al.*, 1994b). Genetic influences on low viability and mortality of calves have been reported (Chenoweth, 1994, Hentges y Morantes, 1985, Vaccaro, 1984). Despite these reports, there is a lack of epidemiologic studies on neonatal morbidity and mortality (Wittum *et al.*, 1984). This study analyzed aspects associated with weakness in newborn crossbred calves.

Materials and methods

Six hundreds and seventy five crossbred calves obtained by systematic crossbreeding using AI among Brahman and crossbred cows, and Holstein (purebred and crosses), Brown Swiss (purebred and crosses), Jersey, Grey Brahman, Red Brahman, German Simmental, Limousine, Beefmaster and Belgian Blue bulls were clinically evaluated in the first 24 h. following birth. The following categories were used; good (no evidence of problem); affected (indication of one or more of the following; weakness, poor cognitive responses, poor suckling, low birth weight), and bad (obvious problems). The clinical nature of problems were certified by a veterinarian. Frequencies of perinatal morbidities, clinical categories and mortalities were recorded and analyzed. The effect of sire breed on weakness occurrence, and seasonal effects on the occurrence of pathological conditions and weakness were analyzed using Chi-Squares. The data were collected from 1990-1994 in a commercial dual-purpose farm in Mene Grande, Zulia State, Venezuela. This region is described as a sub-humid tropical forest. Levamisol 7.5 % (8 mL IM), ADE vitamins + Selenio (8 mL IM) and bacterin against pneumoenteritis (8 mL SC) were administered to cows 30-45 days pre-partum. Good pastures, mineral supplementation and effective parasite and infectious disease control were in place. The herd was free of Brucellosis and TB.

Results and discussion

Perinatal morbitidy, clinical category, and mortality are shown in table 1. A total of 78.81 % of calves were born in good clinical condition, 18.22 % were classified as affected, while 1.32 % were in bad clinical condition. Within perinatal pathologies, weakness (including lack of suckling vigor) was observed most (87.87 %). This suggests that weakness was the main cause for the 18.22 % of calves having affected health at birth. A perinatal mortality of 24 % due to weakness was previously reported in Brahman (Plasse *et al.*, 1994). These findings could help to explain losses due to unknown causes (Montoni y Rojas, 1992), because if a calf born weak does not receive special attention, then it has a higher probability for illness, trauma, starvation and death.

The total perinatal mortality over 4 years (0.43 %) is considered to be excellent in comparison with other reports (Montoni y Rojas, 1992, Plasse *et al.*, 1994, Singh *et al.*, 1989, Wittum *et al.*, 1994b). This probably reflects good perinatal management as well as good prepartum treatment of cows. Effect of sire breed on the occurrence of neonatal weakness is shown in table 2.

Table 1. Perinatal morbitidy, clinical category, and mortality.

Perinatal clinical category			Perinatal morbidity			Survival and mortality		
Category	n	%	Pathology	n	%		n	%
Good	532	78.81	Weakness	116	87.87	Survivors	672	99.55
Affected	123	18.22	Diahrrea	9	6.81	Dead calves:		
Bad	9	1.32	Omphalitis	6	4.54	Diahrrea	1	0.14
No information	11	1.62	Blindness	1	0.75	Dystocia	2	0.29
Totals	675	99.97		132	99.97		675	99.98

Table 2. Effect of sire breed on weakness occurrence.

Sire Breed	Normals	Weakness	Total
Jersey	9	5 (35.7%)	14
Limousine	25	5 (16.6 %)	30
Belgian Blue	29	3 (9.3 %)	32
Beefmaster	132	13 (8.9 %)	145
Simmental	73	7 (8.7 %)	80
Grey Brahman	49	6 (10.9 %)	55
Red Brahman	81	28 (25.6 %)	109
Brown Swiss	62	14 (18.4 %)	76
Holstein	99	35 (26.1 %)	134
Totals	555	116	675

($P < .001$)

Although the syndrome of weakness in newborn calves has not been widely studied, there are some reports linking it with genetic influences in Brahman cattle (Chenoweth, 1994, Hentges y Morantes, 1985). Brown Swiss crossbred calves are reported to have more health problems than Holstein crosses (Vaccaro, 1984).

In this study, 32 of 35 weak crossbred Holstein calves were sired by crossbred Holstein x Brahman bulls. Frisch (1992) indicated that risk of reduced genetic resistance is more likely to occur when both F1 bulls and crossbred dams are related (Frisch, 1992). Such a risk can be increased in areas such as Latin-America, where most farmers do not keep records (Vaccaro *et al.*,1992). In Venezuela, the possibilities for inbreeding are frequent, either because of lack of records, or because of overuse of some fashionable bulls or breeds.

A high occurrence of neonatal weakness (25.60 %) was observed in calves sired by Red Brahman bulls.

Brahman calves, in general, have been reported to have a high occurrence of neonatal weakness (Chenoweth, 1994, Hentges y Morantes, 1985, Plasse *et al.,* 1994). If Red Brahman calves do exhibit more neonatal weakness than greys, this condition might be associated with a high degree of consanguinity.

An occurrence of neonatal weakness of 8-9 %, was observed in calves sired by Belgian Blue, Beefmaster and German Simmental bulls. Such weakness might be attributable to low or heavy birth weight, dystocia, or nutritional and environmental factors (Hentges y Morantes, 1985, Plasse *et al.,* 1994). However, the genetic aspect should be considered because these are breeds without any genetic influence in the females of this herd. The systematic crossbreeding between unrelated breeds increases the advantage of heterosis for both resistance and genetic potential (Frisch, 1992).

Season of birth did not affect either neonatal health classification or the occurrence of neonatal weakness ($P>.05$), but it did affect the occurrence of neonatal pathologies ($P < .05$). Seasonal effects on neonatal health classification and neonatal weakness have not been previously reported. However, in one study, a seasonal effect on neonatal morbidity was not observed (Wittum *et al*., 1994b).

Conclusions

In this study, although perinatal mortality was low, neonatal weakness was relatively common. Neonatal weakness was associated ($P < .001$) with sire breed, but not with season of birth. Thus, genetic factors appear to influence this condition.

The most popular breeds in Venezuelan livestock (Holstein, Red Brahman and Brown Swiss), together with Jersey and Limousine were found to have a high occurrence of neonatal weakness.

Acknowledgments

Authors wish to thank to Consejo de Desarrollo Cientifico y Humanistico (CONDES) from University of Zulia, Mr. Juan Pavan from Manantiales Farm, Dr. Cesar A. Badell , Dr. Manuel Alvarado and Mr. Gabriel Mejias.

Literature cited

Chenoweth, P. J. 1994. Aspects of Reproduction in Female *Bos indicus* Cattle: a review. Australian Veterinary Journal. 71 (12):422-426.

Frisch, J. E. 1992. Exploiting Heterosis to increase Productivity of Beef Cattle in Northern Australia. Proc. Aust. Asso. Anim. Breed. Genet. 10: 273-281.

Hentges, J. F. and G. Morantes. 1985. Factores que Afectan el Vigor del Ternero Recien Nacido y la Respuesta al Amamantamiento en la Raza Brahman. XIX Conferencia Anual Sobre Ganaderia y Avicultura en America Latina. D-15, University of Florida.

Montoni, D. and G. Rojas. 1992. Incidencia y Causas de Mortalidad Pre y Post-Destete en un Rebano Brahman en el Estado Tachira. VIII Cursillo Sobre Bovinos de Carne, 15-36. UCV-FCV, Maracay-Venezuela.

Plasse, D., J. Beltran, O. Verde, N. Marquez, A. Capriles, L. Arriojas, T. Shultz, N. Braschi and A. Benavides. 1994. Tendencias Anuales de Produccion e Influencias Geneticas y Ambientales de un Rebaño Brahman Geneticamente Cerrado. 1. Pesos y Mortalidad de Becerros. Arch. Lationam. Prod. Anim. 2(1):85-102.

Rea, D. E., J. W. Tyler, D. D. Hancock, T. E. Besser, L. Wilson, D. S. Krytenberg and S. G. Sanders. 1996. Prediction of Calf Mortality by use of Test for Passive Transfer of Colostral Immunoglobulin. JAVMA 208 (12):2047-2049.

Singh, R. B., R. R. Mishra and A. E. Nivsarkar. 1989. Pattern of Calf Survivability in Halfbred Cattle. Indian J. Of Anim. Prod. And Management 5 (1): 22-25.

Sttot, G.H., Marx, D.B., Menefee, B.E., and Nightengale, G.T. Colostral Immunoglobulin Transfer in Calves. Period of Absortion. J. Dairy Sci. 62: 1632-1638. 1979.

Vaccaro, L. 1984. The Comparative Performance of Holstein Friesian and Brown Swiss Breeds in Crosses with Tropical Cattle: A Review of the Literature. Tropical Animal Production 9:86-94.

Vaccaro, L., R. Vaccaro and O. Verde. 1992. El Uso de Registros Para la Evaluacion Genetica de Vacas Doble- Proposito. VIII Cursillo Sobre Bovinos de Carne. UCV-FCV, Maracay-Venezuela.

Wittum, T. E., M. D. Salman, M. E. King, R. G. Mortimer, K. G. Odde and D. L. Morris. 1994a. Individual Animal and Maternal Risk Factors for Morbidity and Mortality of Neonatal Beef Calves in Colorado, USA. Preventive Veterinary Medicine 19: 1-13.

Wittum, T. E., M. D. Salman, M. E. King, R. G. Mortimer, K. G. Odde and D. L. Morris. 1994b. The Influence of Neonatal Health on Weaning Weight of Colorado, USA Beef Calves. Preventive Veterinary Medicine 19: 15- 25.