

A Preliminary Study on Artificial Nursing of Young Calves

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Target Audience: Cattle Rearers, Ruminant Nutritionists, Animal Scientists, Veterinarians

Abstract

A substantial amount of young calves entering Nigeria are lost daily when their dams are sold for slaughter. This preliminary study presents a management technique for raising orphan young calves. Six male White Fulani orphan calves, aged between 2 and 4 weeks were grouped into three. The first group of two calves was fed with a mixture of skimmed milk and corn starch. The second group was fed with a mixture of soya milk and corn starch, while the third group of two calves was fed on their respective lactating dam naturally. The calves that were fed on soya milk and corn starch diet died by the 12th and 14th day of the study as a result of dehydration and diarrhoea of nutritional origin. Calves fed by their respective lactating dams had a faster growth rate than calves fed on skimmed milk and corn starch. Over the 18 weeks of this study, the weight gains of the calves fed with skimmed milk and corn starch were significantly lower ($P < 0.05$) than the calves fed by their respective dams. This study concluded that orphan young calves could be artificially raised successfully on skimmed milk and corn starch in Nigeria.

Keywords: Artificial, Nursing, Rearing, Calves

Description of the Problem

Artificial rearing of calves is the separation of calves from their dams as from three to four days after birth. Traditional rearing of calves are based on twice a day suckling of calves up to one month of age and later, when grazing with their dams, calves may suckle throughout the day (1). Calves may be reared for breeding replacements, beef or veal (2) to complement the expansions of cattle population (3). The average daily

weight gain of calves on restricted suckling and artificially reared calves did not differ significantly (4).

Many pregnant cows are on daily basis conveyed by the Trans-nomadic Fulanis through the Gambia, Cote d'Ivoire, Togo and Benin republic routes into Nigeria. One of such routes is the Iwoye – Imeko – Atokun – Abeokuta route. The cows either give birth to calves in transit or are slaughtered with the pregnancy at the abattoirs. The orphan calves die

prematurely as a result of starvation because of their inability to access the dam's milk. The nomadic farmers therefore, prefer to slaughter such calves to save some cost and prevent their total wastage. Development of liquid feed supplements/milk substitutes will therefore ensure that such calves can be salvaged. This preliminary study presents a management technique for raising young orphan calves in Ayetoro, Ogun State, Nigeria.

Materials and Methods

Location of study

The study was carried out in Ayetoro, Ogun State, located on latitude $7^{\circ} 15^1$ N and longitude $3^{\circ} 3^1$ E in a deciduous/derived Savannah zone of Nigeria.

Experimental Animals and management

Four male orphan White Fulani calves aged between 2 and 4 weeks were obtained, tagged, weighed and housed in a disinfected and roofed calf pen located within a paddock at Olabisi Onabanjo University, Yewa Campus, Ayetoro. On the day of arrival, each calf was fed with one litre of glucose solution (two tablespoon of glucose plus one litre of warm water) and repeated every four hours. Two other male White Fulani calves aged 2 weeks and feeding naturally on their respective lactating dams in a herd served as the control.

Experimental design

The four calves were randomly allotted into two groups. Calves in group 1 were

fed with a mixture of soya milk and cornstarch diet. Calves in group 2 were fed with a mixture of powdered skimmed milk and cornstarch diet. Vitamin and mineral premixes were provided *ad-libitum*. Each group was fed separately. All animals were weighed using a spring balance at the commencement of the experiment and thereafter weekly while all associated neonatal problems were noted.

Preparation of powdered skimmed milk and cornstarch replacer diet

Cornstarch was prepared by soaking maize for three days after which it was ground, sieved and stored in small aliquots at 4°C until use. When ready for consumption, heat was applied to each aliquot and boiled for 10 minutes. Cooling was done to 37°C before mixing with skimmed milk at 1 part powdered milk to 1 part cornstarch.

Preparation of soya milk and corn starch replacer diet

The soya bean milk was processed by boiling whole soya bean for 3 hours in water and soaked overnight with another clean hot water. The soaked soya bean were then ground, sieved and boiled for 2 hours, before it could be consumed. Cornstarch was prepared as described above. This milk replacer diet was made up of 1 part of soya bean milk to 1 part of cornstarch.

Feeding regime

Calves in group 1 were fed 50% soya milk and 50% cornstarch using 480ml

feeding bottle (every four hours *ad libitum*) at 37°C.

Calves in group 2 were fed 24g of a commercially available skimmed milk (Cowbell® powder, containing skimmed milk, vegetable fats, sucrose, lecithin and vitamins) and 50% cornstarch using 480ml feeding bottle (every four hours *ad libitum*) at 37°C. Calves in group 3 were fed on their respective lactating dams.

Statistical analysis

Data were analysed using a software package for one way analysis of variance (ANOVA) as previously described (5). Associations between means ($P < 0.05$) were separated with the Duncan's multiple range tests contained in the software package.

Results

Survival of calves

The two calves that were fed with soya milk and cornstarch diet died at the 12th and 14th day after arrival into the calf pen. One calf fed with skimmed milk and

cornstarch died accidentally 29 days after arrival into the calf pen due to strangulation by a neck tag. The other calf as well as the control calves survived until when the study was terminated after 126 days (18 weeks). Accidents are common occurrences in livestock enterprises.

Comparison of calf growth rates

The mean live body weight of the three groups of calves is presented in Table 1. While calves feeding on their respective lactating dams maintained a steady and faster growth rate throughout the study, the weight of their counterparts feeding on powdered skimmed milk and cornstarch diet declined greatly after 4 weeks. There were no significant differences ($P > 0.05$) in the mean live body weight of calves throughout the study. However, on the 16th week, mean live body weight of calves fed with skimmed milk and cornstarch was significantly ($P > 0.05$) lower than their counterparts feeding on the lactating dam.

Week	Skimmed milk+cornstarch	Soya milk+cornstarch	Lactating dam
1	42.95 ^a	28.50 ^a	32.00
2	44.75 ^a	29.75 ^a	33.50
3	46.55 ^a	-	35.55
4	47.75 ^a	-	38.00
5	39.80 ^a	-	40.00
6	40.00 ^a	-	41.25
7	41.00 ^a	-	43.40
8	41.50 ^a	-	45.55
9	42.00 ^a	-	47.10
10	43.00 ^a	-	49.00
11	43.60 ^a	-	50.65
12	44.20 ^a	-	53.60
13	45.00 ^a	-	55.55
14	46.00 ^a	-	57.60
15	47.10 ^a	-	59.10
16	48.70 ^b	-	61.55
17	50.00 ^a	-	64.10
18	51.20 ^a	-	66.30

Means in the same column with similar superscript are not significantly ($P < 0.05$) different.

There were no significant differences ($P > 0.05$) in the mean live weight gain throughout the study except on weeks 5, 8, and 13, when the mean live weight gain of calves fed with skimmed milk and cornstarch was significantly ($P < 0.05$) lower than their counterparts feeding on the lactating dams.

A comparison between the weight gains of the calf fed with skimmed milk and cornstarch and control calves over the 18 weeks of the study showed that, the weight gains between the two groups of calves are significantly different ($P < 0.05$).

Causes of neonatal death

Three calves were lost in the course of this study. One calf feeding on a mixture of skimmed milk and cornstarch died as a result of an accident 29 days after arrival. The other two calves feeding on a mixture of soya milk and cornstarch died as a result of dehydration and diarrhoea of nutritional origin on the 12th and 14th day after arrival into the calf pen.

Discussion

A calf fed with a milk replacer diet of skimmed milk and cornstarch survived until when the study was terminated after 18 weeks. This showed that orphan young calves can be artificially raised

successfully even though there is a dearth of information in this subject area in south west Nigeria. In Tanzania, with the introduction of improved cattle for dairy production, artificial rearing of calves was practiced and calves were separated from their dams three to four days after birth (1).

One calf feeding on a mixture of powdered skimmed milk and cornstarch died as a result of an accident. Accidents are common occurrences in livestock enterprises. In this study, the accident was due to strangulation with a neck tag. The two calves feeding on a mixture of soya milk and cornstarch died as a result of diarrhoea of nutritional origin, leading to dehydration. This confirms earlier reports on calves fed soya bean proteins (6). The level of soya bean replacement in the diet of young calves should be reviewed to determine the optimum inclusion level. Diarrhoea is the commonest disease in young calves and the greatest cause of death (7). Calves are most susceptible to diarrhoea during the first few weeks of life and it may affect up to 20% of all calves (8).

Calves feeding on their dams had a faster growth rate and weekly weight gain than calves feeding on skimmed milk and cornstarch. Several reports have shown that calves under restricted suckling of their dams have higher live weights and growth rates than calves reared under artificial management (9, 10, 11). This is consistent with the result obtained in the present study.

The statistical similarities obtained in the weekly mean live body weight of calves feeding on their dams and those fed on skimmed and corn starch corroborates a previous finding (4) who stated that the average daily weight gain of calves on restricted suckling and artificially reared calves did not differ significantly.

Over the 18-week period of the study, the weight gain of calves fed with powdered milk and corn starch was significantly lower than the weight gain of calves feeding on their respective lactating dams. In a previous study working on kids, it was found that kids running with their dams had lower weight gains when compared to those reared artificially on diets in which up to 50% of milk was replaced with Soya bean diet between 7 and 13 weeks of age (12). They suggested that kids' performance can be improved with artificial rearing. This is not consistent with the result in the present study. The variation may be due to species differences.

Conclusion and Application

Orphan young calves can be artificially raised successfully in Nigeria using skimmed milk and cornstarch mixture. Also calves feeding on their dams had a faster growth rate than artificially raised calves. However, further investigation should be carried out in order to assess the level of soya bean replacement in the diet of young calves.

References

1. Das, S.M., Wiktorson, H. and Forsberg, M. (1999). Effect of calf

- management and level of feed supplementation on milk yield and calf growth of zebu and cross breed cattle in semi-arid tropics. *Livestock Production Science* 59: 67-75.
2. Allen, D. and Kilkenny, E. (1984). Textbook on Planned Beef production. 2nd edition, Published by Collins professional and Technical Books. p.133-142.
 3. Boonbrahm, N., Peters, K.J. and Intisang, W. (2004). The influence of calf rearing methods and milking methods on performance traits of crossbreed dairy cattle in Thailand. 1. Milk yield and udder health. *Archiv fur Tierzucht* 47: 211-224.
 4. Hernandez, V.C., Orihuela, A., Froberg, S. and Lidfors, L.M. (2004). Effect of restricted suckling on some physiological and behaviour stress parameters in dual purpose cattle in the tropics. Proceedings of 38th International Congress of ISAE, 3rd-7th August 2004. Helsinki, Finland. p. 158.
 5. SAS (1999). Statistical Analysis System. User's guide: Statistics. SAS-Institute Incorporated, Cary. NC 27513.
 6. Coblants et al., (1976). Cited by Adenaike, E.A. (1994). Baby Pig nursing trials using Soyabean milk. Undergraduate DVM project, University of Ibadan, 56 pages.
 7. Kahn, C.M. (2005). The Merck Veterinary Manual, 9th edition, Merck & Co., Inc. Rahway, U.S.A. p. 228-233.
 8. DEFRA (Department of Environment, Foods and Rural Affairs), (2003). Improving calf survival. Document accessed from www.defra.gov.uk.
 9. Carias, L. and Vaccaro, R. (1984). Rearing Holstein Friesian and Brown Swiss calves on nurse cows. *Tropical Animal Production* 9: 257-263.
 10. Little, D.A., Anderson, F.M. and Durkin, J.W. (1991). Influence of partial suckling of crossbred dairy cows on milk offtake and calf growth in the Ethiopian highlands. *Tropical Animal Health Production* 23: 108-114.
 11. Sahn, M.V. (1994). Effect of restricted suckling versus artificial rearing on performance and fertility of Bos taurus and Bos indicus cows and calves. M.Sc. thesis, Swedish University of Agricultural Sciences, Uppsala.
 12. Okagbare, O. and Akinsoyinu, A.O. (1997). The performance of pre-weaned West African dwarf goats fed soyabean as replacer for milk. *Nigerian Journal of Animal Production* 24: 57-61