

Effects of Commercial Colostrums Replacement (Globigen®) on Health and Homo-Immune Parameters in Newborn Calf

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Abstract: The neonatal calves, due to their species and special placenta's structure are born without immune system for contrasting the pathogenic factors and rely on the Ig supply of colostrums through passive immunity transfer. The goal (purpose) of this study was surveying the effects of commercial colostrums (Globigen) on calves health, immunity and blood factors. Total 21 Holstein calves were selected in 3 groups in a random model in this study. The experimental group was as follow: Group 1 (7 calves)-control group fed with maternal colostrums. Total weight = 5.5 kg maternal colostrums in 24 h. Treatment 2 (7 calves) fed with half maternal colostrums+half Globigen® Colostrums. Total weight = 5.5 kg in 24 h (2.75 kg maternal colostrums+2.75 g Globigen® Colostrums solved in 2.75 L warm water). Treatment 3 (7 calves) fed with Globigen® Colostrums. Total weight = 5.5 kg in 24 h (550 g solved in 5.5 L warm water). Blood samples collected from all calves 2 times: After birth and 24 h after that again and blood factors inclusive serums density of IgG₁, IgG₂, IgY, cholesterol, triglycerides and glucose, protein, albumin, globulin, ALT, AST and keratin and also weight and fecal score of the calves were surveyed. The SAS98 software was used for statistics analyses and the Duncan test method between comparison of averages ($p < 0.05$) was used to comparison between averages. In this study, immunoglobulins did not increase by Globigen using. The calf's weight had additive effect than the treatments in control group. The calves in 2nd group were suffering from diarrhea and the number of mortality in 2nd group was more than the other groups. Base on the obtained results, Globigen use as a colostrums alternative is not practical and this product can only be used as a colostrums supplement.

Key words: Globigen, colostrums, calf, immunoglobulin, mortality

INTRODUCTION

At the last 20 years, the milking caw training industry had many developments in feeding management, nurturing and breeding. It will take 23-29 month, from calf birth till their 1st procreation. Each caw's efficiency started from its 1st milking. So whatever a caw can has more procreation, it produces more milk too. The most critical period time in an animal life is the after birth time. Statistics shows that about 6% of the calves which born in America die at birth or little while after that. Many of these mortalities are due to navel infections and diseases, respiratory infections and diarrhea. Colostrums is the 1st free from germs milk which is secreted from mammary glands after a normal dry period to wit colostrums is the 1st secretion of mammary glands after

calving which is rich of the immunoglobulin's or antibodies and causes safety for the newborn calf against the pathogenic factors. Although, colostrums are the 1st milk which is used, as nutrients balanced source in calf's feeding at the 1st h after birth. It seems that colostrums mixture is a combination of real milk and non-release blood plasma's components which became 10-15 times agglomerated during passage through the mammary glands before calving. At 1st, the whole colostrums solid materials of fat, vitamins, protein and minerals are richer than normal milk but it has less lactose than milk. Calf can resist against the diseases by timely using proper amounts of colostrums. Calf's need to antibody receipt from colostrums for resistance creation against diseases is different with humans. Human's fetus receives the antibodies, directly from its mother's blood,

so that can show resistance against the diseases at birth time. The even hoof animals can not pass their blood antibodies to their fetus because of the type and nature of their placenta and their newborns have less resistance against the diseases, so that calves need an external source of antibodies which is named colostrums, immediately after birth. If a calf can not get colostrums in 1-2 h after birth its blood antibodies level will decrease and this might result to disease. At the 1st h of the life calf can absorb the antibodies directly into its blood vessels without their being digested. The antibodies absorption can be an important factor in protection of the animal against the diseases. In recent decades, the developments which is created in isolation methods of milk and protein, cause an intense interest for producing a food which contains commercial immunoglobulins. Some factories produced these foods, as a colostrums supplement. These products include dried colostrums with spray method or dried with freezing method (Chelack *et al.*, 1993; Zaremba *et al.*, 1993; Morin *et al.*, 1997) whey or whey's protein concentrate (Seymour *et al.*, 1995; Mee *et al.*, 1996), mixture of dried colostrums with whey (Abel Francisco and Quigley, 1993), the instantly refinement colostrums (Nousiainen *et al.*, 1994) and pureed colostrums immunoglobulin's (Grongnet *et al.*, 1986). There are many different methods, as colostrums fermentation, adding the additives, injecting of the immunoglobulin's but these methods could not prepare an effective method for obtaining the immunoglobulin's or to tabernacle the colostrums. Globigen is a commercial product which is full of egg yolks proteins that is introduced, as a colostrums alternative and seems to increase survival and immunoglobulin's quality in newborn calves. In this study, Globigen have been used as cholesterol alternate. The goal (purpose) of this study was surveying the effects of Globigen on calves health, immunity and blood factors.

MATERIALS AND METHODS

In this study, 21 Holstein calves were used in a dairy farm around the Karaj City (Mohammad Shahr) in Iran. All calving were between 1st-4th far row (bearing). All calving were handling by a vet. Calves become dry and separated from their mothers 10-15 min after birth and after disinfection of umbilical stalk with 3% iodine tincture calssificated randomly. The study groups include: Group 1 (7 calves) control group fed with maternal colostrums. Total weight = 5.5 kg maternal colostrums in 24 h. Treatment 2 (7 calves) fed with half maternal colostrums+half Globigen® Colostrums. Total weight = 5.5 kg in 24 h (2.75 kg maternal colostrums+2.75 g Globigen® Colostrums solved in 2.75 L warm water). Treatment 3 (7 calves) fed with

Globigen® Colostrums. Total weight = 5.5 kg in 24 h (550 g solved in 5.5 L warm water). Bleeding from calves have been done in 2 steps. The 1st step of bleeding was immediately after birth and the 2nd one was 24 h after birth. During the first 24 h after birth the calves were fed once immediately after birth and then in 6th-8th h and after that 16th-20th h of birth. Calves feeding have been done with pacifier and in manual type. In this study, Globigen powder which is a mixture of colostrums and egg yolk and has been made in GMP Company in Germany was used.

Bleeding and measured parameters (variety): Bleeding from calves have been done in 2 steps (The 1st step of bleeding was immediately after birth and the 2nd one was 24 h after birth). The calves were bleeding immediately after birth to ensure that they do not have any immunoglobulins when they are born. The 2nd bleeding was 24 h after birth. At last, the blood serum was parted from plasma with centrifuges. Blood samples were freeze and tainted in -20°C until the hormonal analyses. At last, after melting (refreezing) the samples, harmonic parameters, as serums density of IgG₁, IgG₂, IgY, cholesterol, triglycerides, glucose, protein, albumin, globulin, ALT, AST and keratin were examined.

Colostrums collecting and keeping: Fresh colostrums were milked from new calving cows. This colostrum has been used for feeding calves at the first 24 h after birth. In this case, after the 1st feeding, the remaining colostrums was kept in 2°C and for the 2nd and 3rd feeding after warming with bath method, it has been consummated by (for) calves.

Body temperature and weight measuring: The calf's body temperature information was recorded every day until their 10th day after birth. The calves weighing was done once immediately after birth and then every 10 days until 20th day after birth before the morning feeding.

Statistical analysis: Obtained data were classified using Excel program and analyzed using SAS program. Mean comparison was done using Duncan's multiple ranges test ($p < 0.05$).

RESULTS

Analyses of blood parameters results

Immunoglobulin's analyses: The analyses results showed that immunoglobulin's serums density rate in 1st bleeding was meaningless (pointless) ($p > 0.05$) but in the 2nd bleeding the IgG₁ serums density of the control group has additive (increasing) effect over (than) treatments and this effects was significant ($p < 0.05$).

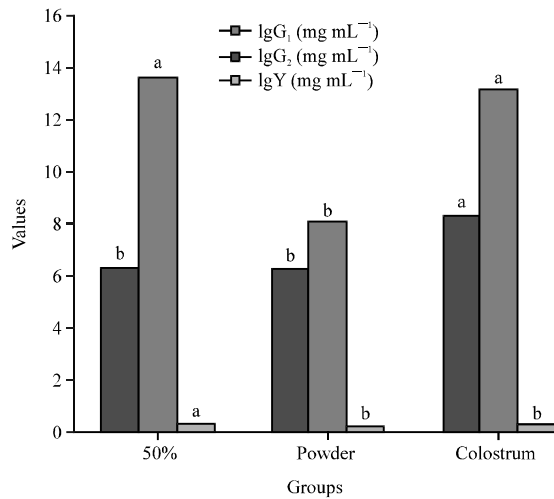


Fig. 1: The IgG₁, IgG₂, IgY average in the groups

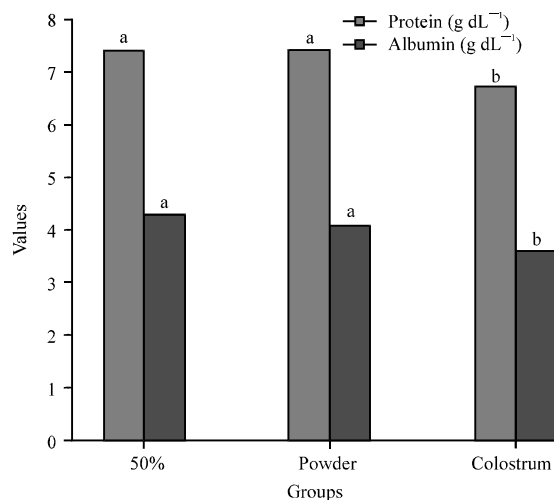


Fig. 2: Albumin and protein analysis result

The rate of the IgG₂ serums density in the 2nd group decreased ($p>0.05$). The IgY serums density in the 1st treatment had additive effect and it was significant (meaningful) ($p<0.05$) (Fig. 1).

Cholesterol, triglycerides and glucose analyses: The analyses results showed that Globijen effect on cholesterol, triglyceride and glucose no significant meaning (pointless) ($p>0.05$).

Blood protein analyses: The analyses results showed that total protein rate in control group over the 1st and 2nd group was less with Globijen consumption. The 1st and 2nd groups had no significant differences over each other but the difference was significant than the control group ($p<0.05$) (Fig. 2).

Albumin and globulin analyses: The analyses results showed that the albumins serums density rate decreased in control group and it was significant ($p<0.05$). The globulins serums density increased in 2nd treatment than 2 other groups and but there was not no significant differences between 3 groups (Fig. 2).

Liver enzymes (ALT, AST) analyses: The analyses results showed that the liver enzymes (ALT, AST) serums density rate in control group had additive effects than treatments but no significant differences observed between groups ($p>0.05$).

Keratin analyses: The analyses results showed that the Globijen effect on keratin had no significant difference between the study groups ($p>0.05$).

DISCUSSION

The period between calf's born till, its maturity is a very important time and this period is considered, as a biggest metabolic and stress challenge in a calf's life. During this critical period, a calf which is comforting (facing) the new uterus's outside environment after survival should be consider taking and supported through homeostasis method. Calves successful breeding among these challenges need compilation of feeding, environment and calf's health management. These factors are closely related to each other and calves physiological evolution is affected by them too. Health and hygiene control national system defined from scientists studies about heifers breeding that in 1991 heifers mortality from birth to weaning is about 8.4% (NAHMS, 1993) and in 1995 this rate was about 11% (NAHMS, 1996) in United States. This high rate of mortality is not acceptable because this rate of mortality causes a big loss (harm) to American cow breeding industry. At the other side this rate between heifers in after weaning till parturition period was just 2.2 (NAHMS, 1993) and 2.4 (NAHMS, 1996), so the important period of financial loss from mortality is the period between birth to weaning. The total costs for calf training (breeding) in each day at the first 3 months of life are more than the other growth steps (Tyler and Ramsey, 1993). Among the animals especially ruminants, the histology and anatomical structure (anatomy) of placenta is so that there is not any possibility for antibody to transfer from mother's blood to fetus. Antibodies transfer through colostrums is the main (most important) and efficacious (fastest) protecting immune mechanisms for new born calves. Calves which are not able to absorb colostrums antibodies are more sensitive to infancy diseases than those who received enough antibodies from colostrums. Immunoglobulin's transmission from mother to child is very important. A suffering from

inactive immune defect resulting from antibodies transmission failure calf can be defined with quick measurement of new born calves blood serums immunoglobulin's and quick diagnosis of colostrums antibodies transmission failure.

In this study, the immunoglobulin's IgG₁, IgG₂ and IgY rate have been measured. This experiment showed that the immunoglobulin's serum density rates were not significant in the 1st bleeding. In the 2nd bleeding, IgG₁ serum density had additive effects, IgG₂ serum density rate decreased and IgY increased. IgG₁ is the major immunoglobulin in colostrums which is origin from mother's serum. Immunoglobulin's transfer from mother's blood to mammary glands started from several weeks before calving and till 1-3 days to calving become to maximum amount (rate). Inactive immune defect rate in new born calves which receive colostrums from their mother's breast, pacifier bottle and esophageal tube were 61, 19 and 10%, respectively (Besser and Gay, 1985). The earlier study is assertive of fewer incidences for inactive immune defect in colostrums prescription with esophageal tube. Obviously the immune defect incidence decrease in calves which receive >100 g IgG₁ from colostrums (Besser and Gay, 1985). Stott (1980) showed that colostrums absorption and serum antibodies rates were more in calves which stay with their mothers but this difference was not significant (Selim *et al.*, 1995). In another study, results showed that in calves which received specific amounts of colostrums, the serum antibodies density in the first 7 h of live were more than those which were nursing by their mothers (Stott, 1980) and this point conforms to this study. Immunoglobulin's density in calf's blood serum which could suck their mother's breast was more than those which were fed with pacifier bottle for each unit of consuming colostrums. It has been reported that immunoglobulin's absorption is more when a calf can suck a pacifier bottle than colostrums feeding with an esophageal tube (McCoy *et al.*, 1970). In this study, the amount of immunoglobulin type G did not have any significant difference and the reason of IgG₂ rate increase in the 1st group was which conform with (Lateur-Rowet and Breukink, 1983) results. Globijen consuming caused an increase in total serum protein rate which did not conform to results. Immunoglobulins are blood protein components and the total serum protein rate will increase due to their increasing in blood. Albumin and globulin are serum total proteins. In this study, Globijen consumption did not have any effect on blood albumin and globulin rate and this conform to results (Lateur-Rowet and Breukink, 1983).

The liver is center of body protein metabolism and it discharges amino transferase which includes alanine

amino transferase and aspartame amino transferase. Globijen consumption did not have any effect on liver enzymes which conform with results (Quigley *et al.*, 2006). Globijen consumption did not due to weight gain in calves and the weight gain rate in control group was more than other groups and this imperfection with results (Quigley *et al.*, 2006).

The most important reason for mortality among the animals is tainting with viruses and losing lots of water and body electrolytes through diarrhea which cases dehydration and acidosis. Diarrhea and subsequent losing body water is one of the main cases of death (mortality) before weaning. Globijen consumption was useless about calves protection against diarrhea and it conform to results (Quigley *et al.*, 2006).

CONCLUSION

Base on this study results Globijen use, as colostrums alternative is not practical and this product can only be used as a colostrums supplement.

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