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EVALUATING EGGSHELL POWDER AS A PREVENTIVE MEASURE FOR HYPOCALCEMIA IN DAIRY COWS

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ABSTRACT

The purpose of this study was to find out how well eggshell powder (ESP) works in pregnant dairy cows to improve colostrum calcium levels and prevent hypocalcemia. The Gomal University D I Khan animal ethics committee approved the methods used in this experiment, which involved fifteen pregnant cows and was carried out at the Government Cattle Breeding and Dairy Farm in Harrichand, KPK. The test cows were split into three groups: Group E, which received 9g of eggshell powder per 100g of feed; Group D, which received dicalcium phosphate (DCP); and Group C, which received no supplementation at all. The trial focused on serum blood calcium levels parameter, and it took place in the last month of parturition. The findings showed that Group E had significantly higher calcium levels (2 mg/dl) and about 15% improvement in blood calcium throughout the course of the trial period in comparison to the other groups. The cows in Group E showed a noteworthy daily consumption of 300g of ESP, whereas the commercial group ingested 300g of DCP, which was different from the control group's typical feed intake.

Keyword: Dairy cow in pregnancy, blood calcium level, and prevention of hypocalcemia.

INTRODUCTION

An abrupt decrease in the calcium content of the animal's blood is the cause of milk fever. It is brought on by a diet low in calcium or an unbalanced intake of phosphorus and calcium. Milk fever manifests as trembling in the muscles, sadness, weakness, and inactivity. Milk fever is treated by intravenous calcium and phosphorus infusion as well as vocal delivery of calcium and phosp supplements. Including adequate Ca and P in the feed and avoiding abrupt dietary changes are two ways to prevent milk fever. 34% of cows and 62% of buffaloes produce more milk than they do (Govt of Pakistan, 2009).

Due to its economic significance, milk fever has been extensively studied since it was first documented in Germany in 1793 (Schulz, 1971). Hypocalcemia is a metabolic disorder brought on by insufficient calcium. Depression, decreased appetite, production of milk, and rumination are among the symptoms. It can be lethal if neglected. Treatment entails giving electrolytes, calcium, and a healthy diet. You can prevent by managing your diet properly. Although it can happen to nursing cows as well, it is most frequently observed in cows who are about to give birth (Goff, 2008).

In dairy cattle, hypocalcemia and subclinical milk fever should be managed under close monitoring. The 28-day transition phase, also known as the perparturient period, is distinguished by a significantly elevated risk of hypocalcemia. (Gris, 2008). Either clinical or asymptomatic milk fever can occur. Ataxia, anorexia, hypothermia, sluggish breathing, a rapid and weak heartbeat, and paralysis are among the symptoms. Particularly during calving, dairy operators should minimize the energy source of feed. Farmers should keep an eye out for symptoms of milk fever in cows 48–72 hours before to and following calving (CRIVEI et al., 2021).

Ca+ is maintained in mature cow blood between 2.1 and 2.5 mmol/L (8.5 and 10 mg/dl). Blood samples taken thus close to calving time reveal hypocalcemia in dairy cows. First-time calving cows typically had blood concentrations of 25% less than 2 mmol/L (8 mg/dL). Yet according to Goff (2008), 50% of aged cows deteriorate to this level.

It is recommended to treat hypocalcemia and subclinical hypocalcemia as hatchway disorders that significantly reduce the risk of complete razorback during the next lactation. Reduced rumen and abomasal motility increase the risk of abomasal excretion in hypocalcemia. Hypocalcemia reduces feed intake, causing increased body fat to develop during ancient breastfeeding without automatic response. The danger of mastitis increases when hypocalcemia lowers all muscle cutting down, including the teat sphincter muscle, which stops the teat from rupturing after milking. Recent research has shown that the rapid effects of milk fever inhibit immune cell recovery to run boost (Kimura et al., 2006).

To stave off the illness, intramuscular injections of 25-hydroxycholecalciferol and its synthetic equivalent, 1-hydroxycholecalciferol, were produced to be administered six to three days before to calving. Because the medications were not consistently administered at the appropriate period in relation to calving, this strategy had little success. Bar and associates, 1980). In 1930, one of the first fundamental medications for milk fever was published: calcium gluconate (Robertson A 1949). A prime example of down cow incidents involves hypocalcemia treatments (Milk Fever Treatments) that were discontinued before to the outbreak of World War II (Hallgren, 1955).

According to reports at the time, between 3.8% and 28.2% of all hypocalcemia cases were skillfully downer cows, with a case fatality rate ranging from 20% to 67.0% (Smith et al., 1997). According to a scrobe study of case record-able cases at the Ontario Veterinary College, 4.5% of cows treated for parturient paresis (also known as milk fever) resulted in Downers cows (Curtis et al., 1970). The Downer Cows' symptoms have no known worldwide source, but they are essentially a male sequel to milk fever, where disorientation can worsen due to late or absent calcium channel blockers, leading to conditions including muscle necrosis and nerve paralysis. Furthermore, loss of potassium, magnesium, and phosphorus due to slight metabolic disruption has been advised as a risk factor, but no direct attest-er

The division of a stoop animals into the (a) class and the recording of biologically influencing components are usually necessary before linked affiliation on which to fundamental therapy can be shown. This is because it provides the best explanation of therapeutic diplomacy and measures their advantages for Anti Downer Cows (Houe et al., 2001). Hypocalcemia in the normal range of other parameters such as magnesium and phosphorus levels in the blood of dairy cows.

Zinc, calcium, magnesium, and P are among the minerals found in egg shell powder (ESP). As a dietary supplement, it is applicable. It promotes the formation of cartilage and chondrocyte diffraction. Reduced ailment and increased movable bone absorption that ends reduced bone mass in women affected by the illness and in elderly people experiencing bone discomfort. According to piglet testing, the level of pure Ca (co3) in the water is either higher than or on par with that of the feed class. Clinical and experimental studies demonstrate that bone and cartilage have a favorable effect in both preventing and treating (Rovenskyetal.,2003).

Cow and buffalo milk Yogurt with enhanced nano-ESP: high calcium content, composition, and quality. Composition, texture, and sensory attributes of yogurt made from cow and buffalo milk with a 0.3% addition of Nano-ESP. Yogurt Ca ingredients increased as a result of the addition by around 15%. Yogurt high in calcium has more health benefits than osteoporosis (Shibiny et al., 2018). One typical waste product is egg shells. They include calcium that is bioavailable. It appears safe for people based on studies. It strengthens and re mineralizes teeth. Urinary stones can be removed using it. Supplements containing calcium are inferior to eggshell powder. It is used to manufacture dairy products and fortified meals. It's a cheap, bioavailable source of calcium, according to studies. Strontium and other trace minerals can be found in eggshells. It can be taken in place of calcium. Frequent usage can enhance one's calcium levels (Chakraborty, 2019).

Material and Method

Experimental animal and management

The government dairy and cattle breeding farm Harrichand kpk served as the site of this experiment. Thirteen cows (n=15) were used in this experiment to test jerseys. The Gomal University D I Khan animal ethical committee accepted the experiment design and all associated procedures via letter no. 120/ERB/GU.

There are five trails in this experiment: the first ran from day 1 to day 5, the second from day 5 to day 10, the third from day 10 to day 15, the fourth from day 15 to day 20, and the fifth from day 20 to day 25. Three groups comprise the experimental animal: five jersey cows in the first group (which is experimental) received egg shell powder; the other group of jersey cows is another brand.

Experimental design

There were fifteen (15) pregnant Jersey cows in the experiment. The experimental cows were divided into three groups: group E consisted of five jersey cows. Eggshell powder was administered to the experimental cows at a rate of 0.9 g/100 g of diet. But Wanda also mixed DCP in a second batch (B) that weighed 200g/4kg. Group (C) did not receive any kind of calcium supplementation and was maintained as a control group. Each group's cows were kept apart from one another. The trial ran for thirty days.

Dosage

Eggshell powder 300g/4kg wanda (0.9% (0.9 g Ca/100 g food) was given to the experimental animal group (E) (Brun et al, 2013). Daily (ESP) deliveries were made to the experimental group during the final month of pregnancy.

Intervention

Group E will get a supplement of eggshell powder, while Group B's pregnant cows will be given commercial calcium supplements throughout the last month of their pregnancy.

Blood collection

Blood was drawn from jugular veins in all animal groups using an 18-gauge, 5 milliliter sterile syringe at the conclusion of the 30-day trial. The blood was allowed to coagulate for serum collection for biochemical analysis after it was stored for the blood parameters in an EDTA anticoagulant screw-top vacutainer. A chemical analyzer (Taiwan) was used in the veterinary research institution in Peshawar, KPK, to detect blood parameters such as calcium levels. Serum samples were separated by centrifuging the material for ten minutes at 5000xg. The target dates for blood collections were d 1, 3, 5, 7, 14, 21, and 28 following calving and 30 days prior to calving.

Chemistry analyzer

The blood for the serum biochemical profile was collected every fortnight in a sterile clot activator gel vacutainer tube in compliance with standard protocol for blood collection. The blood sample was analyzed with a semi-automatic chemistry analyzer (chemo-o-test, Biogen Technologies, Germany).

Cpc test for calcium level

A sample was obtained and then the test was administered. Ca+ cpc regent 25ml, Ca+ cpc diluent 25ml, and Ca+ cpc standard 10ml are the three regent items in the package. 500 diluent + 500 ul regent is the working solution. Three distinct tubes First standard, Second blank, Third test. First blank tube has 1000 ul of regent; second standard tube contains 1000 ul of regent and 20 ul of standard; third test tube contains 1000 ul of regent and 20 ul of sample. After mixing each tube, they were allowed to sit at room temperature for five minutes. Aspirate the tube to read it after the incubation period. First, the chemistry analyzer calculates the blank; second, it reads the standard; and third, it aspirates the sample tube containing the patient; the chemical analyzer then computes the result of the blank, standard, and sample.

Data analysis

Mean ± Standard Error of Mean is how the data will be displayed. The ANOVA test will be used to assess comparisons between and within groups. To evaluate the data, SPSS (Statistical Package for Social Sciences) will be utilized. $P < 0.05$ is going to be regarded as significant.

Interpretation

interpretation of the data and a discussion of the findings in light of previous research, with an emphasis on how well eggshell powder works to keep dairy cows from becoming hypo calcified.

Recommendations

Recommending, in light of the study's findings, that pregnant cows take eggshell powder as a calcium supplement. Additionally, the Veterinary Research Institute and the Directorate General (Ext) Livestock and Dairy Development are located in Peshawar, KPK.

Result

Because the cow is not dependent on the eggshell powder (100g/4kg), the daily feed intake of the experimental was quite low when it first started.

As compared to the control group and other groups that were also fed eggshell powder, the experimental group of cows, E and B, had considerably higher Ca levels due to the Hypocalcemia parameter result. Table No. displays the impact of Egg Shell Powder (ESP) on the rise in calcium (Ca). All cows had comparable calcium levels at the beginning of the experiment, ranging from 8.01 to 8.25 mg/dl.

The results of the calcium increases over the first five days indicated that, by day 10, none of the experimental groups' calves given eggshell powder at a rate of 100g/4kg Wanda had seen a substantial rise. In comparison to another group, the results of day 6 indicated that group E of eggshell powder had the greatest calcium improvement (8.11+8.25 mg/dl). Group B's and Group C's increases in calcium were not statistically significant (8.01+8.22 and 8.09+8.25 mg/dl, respectively). Group E's calcium level is rising quickly, while Group B's is greater than Group C's.

According to the results, on day 10, group E needed to greatly improve the highest calcium (8.15+8.29 mg/dl) in comparison to the control group. Compared to Group B and C, Group E cows had a much larger rise in calcium. Group B's calcium improvement (equal to 8.03+8.25 mg/dl) is greater than that of the control group (C). (8.06 + 8.21 mg/dl) in Group C. Group E cows had a much higher rise in calcium than both control group C and group B, which received a different calcium supplement (Group E 8.51+8.80 mg/dl). On day 15, the calcium levels of Group B cows were noticeably higher than those of Group C cows; however, this was followed by a decline in calcium levels as a result of near parturition (Group B 8.12+8.27 mg/dl and Group C 8.07+8.22 mg/dl).The eggshell powder (Group E 8.61+9.00 mg/dl) will cause the experimental group's calcium level to rise sharply by day 20. However, the other two groups—Group B 8.11+8.15 mg/dl and Group C 8.05+8.15 mg/dl—will decline in proportion as a result of almost parturition of the necessary calcium Compared to groups B and C, group E had the highest calcium level on day 25 (8.88+9.14 mg/dl), whereas groups C and B have steadily declining calcium levels (Group B 8.07+8.10) and (Group C 8.03+8+10 mg/dl).

At the conclusion of the study, Group E cows had the considerably largest increase in calcium (9.01+9.38 mg/dl). Regretfully, hypocalcemia did not impact groups B or C, despite their lower calcium levels (Group B8.03+8.08 mg/dl and Group C 8.02+8.04 mg/dl). At the conclusion of the study, Group B's calcium rises are greater than Group C's.

Table 1. Effect of eggshell powder on daily feed intake in dairy cows. Group (E)

Tag NO:	1st test	2nd test	3rd test	4th test	5th test	6th test
J 297	8.21mg/dl	8.25mg/dl	8.80mg/dl	9.00mg/dl	9.10mg/dl	9.30mg/dl
J 305	8.11mg/dl	8.15mg/dl	8.51mg/dl	8.61mg/dl	8.88mg/dl	9.01mg/dl
J 306	8.25mg/dl	8.29mg/dl	8.77mg/dl	8.95mg/dl	9.14mg/dl	9.38mg/dl
J 164	8.01mg/dl	8.25mg/dl	8.35mg/dl	8.55mg/dl	8.95mg/dl	9.25mg/dl
J 170	8.12mg/dl	8.35mg/dl	8.45mg/dl	8.65mg/dl	8.85mg/dl	9.00mg/dl

Table 2. Effect of other Brand calcium on daily feed intake on dairy cows. Group B)

Tag No:	1st test	2nd test	3rd test	4th test	5th test	6th test
J 297	8.01mgdl	8.03mg/dl	8.12mg/dl	8.11mg/dl	8.10mg/dl	8.05mg/dl
J 305	8.11mgdl	8.15mg/dl	8.13mg/dl	8.12mg/dl	8.07mg/dl	8.03mg/dl
J 306	8.22mgdl	8.21mg/dl	8.27mg/dl	8.15mg/dl	8.10mg/dl	8.08mg/dl
J 164	8.12mgdl	8.23mg/dl	8.29mg/dl	8.33mg/dl	8.22mg/dl	8.32mg/dl
J 170	8.02mgdl	8.12mg/dl	8.22mg/dl	8.32mg/dl	8.36mg/dl	8.36mg/dl

Table 3. Normal feed intake on a daily base on dairy cows. Group (C).

Tag no:	1st test	2nd test	3rd test	4th test	5th test	6th test
J 296	8.09mg/dl	8.06mg/dl	8.07mg/dl	8.05mg/dl	8.03mg/dl	8.14mg/dl
J 300	8.16mg/dl	8.14mg/dl	8.16mg/dl	8.11mg/dl	8.09mg/dl	8.07mg/dl
J 304	8.25mg/dl	8.21mg/dl	8.22mg/dl	8.15mg/dl	8.10mg/dl	8.05mg/dl
J 132	8.26mg/dl	8.21mg/dl	8.18mg/dl	8.15mg/dl	8.15mg/dl	8.17mg/dl
J 136	8.35mg/dl	8.20mg/dl	8.19mg/dl	8.16mg/dl	8.17mg/dl	8.14mg/dl

Discussion

The agricultural abstract by cited the first mention of the condition recognized as hypocalcemia in cattle (Horst et al., 1997). Current, well-written veterinary textbooks portray it as a birth sickness that affects cows several days prior to or during parturition, rendering the affected cows incapable of growing. Various organic and inorganic circumlocution sch, including alum, niter, eman emulsion of tartar, hot ale, and vigorous beer, are employed as treatments. (Clater, 1845) defender prevents the illness by obtaining 10 pints of blood from the prepartum hemorrhage of afflicted animals. Schmidt (1897) suggested that the cause of the udder's toxicity after parturition was a matter of bravery, as the poison impacted the mid-nervous system and muscles. He describes the clinical indicators that are identified as Better-milking cows are typically attacked by this illness after a few days of prolonged labor.

Much fewer prior to the third or fourth delivery. After giving birth, the cow experiences emotional upheaval within 24 to 48 hours. She lashes out at the vertebrate below with her hind feet, cleans her tail, grinds her teeth, becomes weak, and eventually lies unconscious from the muscle on her head, which is either literal or frequently followed by what happens. The eyeballs are all out, injected, and stupid; there is no natural time, no spontaneous movement, and no pack away strength. Fall of milk meal, digestion is being attended to, a combination of the abdominal contents fixed in, along with tympani, hindrance, ranch, and urine inhalation. The pulse gets finer or older.

The temperature is lowered or dulled, and breathing is decreased—often in an asthmatic or grumbling manner. If there is no feast, the patients gradually deteriorate into a long-term coma or heart failure, which ends in two or three days. Developed a method of treating the udders by injecting potassium iodide (in off-Kashmiri ambient air) into the nipples, which boosted band growth. The next category is fast repair general, with an abstract of 40–60% and back treatments, of 10–24%. This follow-up is in addition to the standard monograph on the disease's origin (Moussu & Dollar, 1905).

It was not until the early 1900s that the cause of hypocalcemia was identified. The first piece of advice (Dryerre & Grieg 1925) is that it may be related to parathyroid loss, which might lead to the accumulation of recurrent decimal poisoning, such as etiologies that include failings of serum calcium centralization. According to Fish (1929), cattle with normal blood calcium had a phosphorus ratio of 1:9, but those under stress due to hypocalcemia had a ratio of 2 in their system. These ratios don't really relate to the current state of biochemical quality cover.

The application of Ca+ in blood from calves exhibiting outward symptoms of owaspocalcemwasere incomplete by as much as 50%, according to Little's 1932 research; the more severe the external manifestations, the lower the blood calcium concentration. After doing these

searches, it was determined that cattle exhibiting acute or subacute external indications would benefit from intravenous fermentation of calcium boro gluconate (Drye & Grieg, 1925) and Ca+ and mg chlorides (Pulles, 1933). (Sporri & Raggenbass, 1940) discover that the subcutaneous or intravenous injection of calcium gluconate may be used to treat the applicant cattle's declining indiscipline myocardial looping and the ventral thalamic peduncle contraction of the heart's chambers.

Nowadays, the more common therapy for hypocalcemia is no longer the intravenous administration of Ca+ borogluconate calcifications. The veterinarian for the herd's animals concluded after careful consideration that the unexpected high demand for Ca+ at the beginning of lactation, which was unaffected by the feed's Ca+ level, was the cause of the low blood Ca+ application. According to Little's (1932) suggestion, a late-pregnant cow should be fed 4 ounces of calcium oxide per day in order to meet the fetal requirement for calcium. Additionally, after giving birth, the cow should consume around 13 liters (three gallons) of colostrum, which is six times its typical daily consumption of calcium oxide in order to maintain homeostasis. (Collips, 1925).

The first step establishes how the parathyroid gland arranges the administration of Ca+ in the circulation. Subsequently, (Taylor et al., 1934) presented the theory that vitamin D-qualified blood Ca+ application fully applies to parathyroid tissue at a Royal Society conference in London. (Greig, 1935) the theory that the parathyroid glands of applicated cattle were removed, reducing their capacity to stimulate Ca+. According to (Campbell & Turner, 1943), vitamin D can be administered therapeutically to grow parathyroid movement during parturition and the first lactation, buffer the need for activation date, and reduce the chance of cattle developing advanced hypocalcemia. (Hibbs et al., 1947) discover that adding vitamin D to a prepartum cow's diet will increase the amount of phosphorus and calcium in the blood for exactly 12 hours following therapy; if childbirth did not coincide with that dietary window, the hypocalcemia case was closed. (Hibbs et al., 1960) established that the cattle were considered mortal until one day after giving birth, and that the diet consisting of injecting 2 × 107 in of vitamin D twice a day for five days was the best course of action.

The veterinary press indicated that the harsh poison inspired cattle to use such a high dose of vitamin D, essentially with honor to drop of Ca+ salts in comfy tissues. Seekles, 1964. More external experiments were conducted on Jersey cows with an 80% optimal quantity and no contrary external symptoms in order to determine a better avoid therapy utilizing 250 mg crystalline vitamin D3, injection intramuscularly in over 100,000 dairy cattle, excluding any disadvantageous conclusion (Gregorovic et al., 1967). By increasing the plasma application of ionized calcium (Ca2+) and inorganic phosphorus through increased feed consumption and bone-removal, vitamin D3 (cholecalciferol) is activated. Under the influence of parathyroid hormone (PTH), which is physiologically active, the vitamin hydroxides first to 25-hydroxycholecalciferol (25-[OH] D3) in the liver and then to 1α,25-dihydroxycholecalciferol (1,25-[OH]2 D3) in the kidney. (Sansom et al., 967) According to Weighton's 1942 study, blood magnesium was regularly administered within a reasonable range, and milk fever was an undisciplined life companion caused by hypophosphatemia and hypoglycemia in cross-bred Lincoln Red shorthorns. Mullen (1975) provided an explanation of the means associated with or accompanying hypophosphatemia based on their analysis of 186 instances The plasma application of ionized Ca+ (Ca2+) and inorganic p of hypocalcemia, as well as their treatment with the absorption of various soluble Ca+ salts, activate vitamin D3 (cholecalciferol).

With the exception of specific phosphorus therapy, he noted that barely 50% of the patients also had hypophosphatemia. There was no correlation between the lack of outward indications in cattle and the decreased blood application of phosphorus. (Mullen, 1975) the authority that the parathyroid gland should be stimulated 30 days before to parturition by phosphorus-rich diets. Many years ago, research was conducted on the potential applications of various materials for mending roads. The results of this research were positive and continued. This resulted on the use of impressive, polymers, pony, oils, cloth, and other inorganic and organic targets being used more advanced or increased to

asphaltic surface area. This not only allows for the removal of pure material blockages in asphaltic man-made areas that are mended (Erfan et al., 2015). It is imperative that a hundred million tons of useless chicken egg shells are produced nationwide. End of each year, but keep in mind that it has other applications. For example, a vast distribution of egg shells may be beneficial for mineral salts such as calcium, phosphorus, magnesium, molybdenum, iron, copper, zinc, and fluorine. In order to maintain its supremacy over bitumen, the finder chooses this purpose to the extent that it dominates the chemical cement goal.

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