Pakistan J. Zool., pp 1-3, 2022. **DOI**: https://dx.doi.org/10.17582/journal.pjz/20170723160722

Short Communication

Comparative Effects of Deworming, Mineral and Vitamin Supplementation on Humoral Response against Peste de Petits Ruminants Vaccine in Goats

Abdullah Iqbal[1], Muhammad Abubakar[2], Shumaila Manzoor[3], Muhammad Kamran Ameen[4] and Rani Faryal[1]*

[1]Department of Microbiology, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan.
[2]National Veterinary Laboratory, Park Road, Islamabad, Pakistan.
[3]Progressive Control of Peste des Petits Ruminants (PPR) in Pakistan, FAO, Islamabad.
[4]Department of Animal Sciences, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad, Pakistan

Article Information
Received 23 July 2017
Revised 02 October 2020
Accepted 09 November 2020
Available online 08 June 2022
(early access)

Authors' Contribution
RF and MA conceived the idea. AI, MKA and SM conducted the experiment and all authors participated in write up and approved the manuscript.

Key words
Peste des petits ruminants, Vaccination, Humoral immunity, Vitamins, Minerals

ABSTRACT

This study aimed to evaluate the effect of mineral supplementation, vitamin supplementation and deworming on humoral response against PPR vaccine in local goats. Group 1 and group 2 goats were given mineral supplementation and fat-soluble vitamin supplementation for 21 days. Group 3 goats were twice dewormed with Fenbendazole. Group 4 bucks were kept as controls. All bucks were vaccinated with the Pestivac vaccine. Antibodies detection was done using competitive ELISA from serum samples. Antigen shedding by vaccinated animals via nasal and fecal route was checked by the haemagglutination test and RT-PCR. All group 2 bucks, developed humoral protection against PPR within the 1st week. Only, 50 percent bucks of group 1 developed humoral protection against PPR after one week of vaccination. The mean percent inhibition value of competition-ELISA of group 2 was half the mean percent inhibition values of group 3 and group 4 after one week of vaccination. There was no antigen shedding through nasal or fecal route after vaccination in any animal included in the study.

Peste des Petits Ruminants (PPR) is a major viral disease of domesticated and wild small ruminants caused by Peste des Petits Ruminants Virus (PPRV). The first outbreak of PPR was reported from Pakistan back in 1994. Since, then many PPR outbreaks have been reported from various areas of Pakistan (Zahur *et al*., 2014). In the naïve population, morbidity and mortality rates of PPR can reach up to 80-100%, but morbidity and mortality rates are generally lower in endemic areas of Pakistan (Abubakar *et al*., 2008).

Phylogenetic analysis of PPRV isolated from outbreaks in Pakistan indicated that PPRV present in Pakistan belongs to lineage IV of PPRV (Munir et al., 2011). Live attenuated vaccine of PPRV Nigerian strain 75/1 is commonly used in Pakistan (Abubakar et al., 2015). Minerals and vitamins play a significant role in the development of both innate and adaptive immune responses. Endoparasites use the nutrients of animals and cause stress on animals (Hanssen *et al*., 2013). The present study was designed to evaluate and compare the effect of mineral supplementation, vitamin supplementation and deworming on the development of antibody-mediated immune response against PPR vaccine in the local goat breed to improve health for better meat production.

Material and methods

A total of 32 bucks having the same age and sero-negative for PPR were selected for this study. All experimental animals were injected with 1 ml of Pestivac Jovac, (Jordan) live attenuated PPR vaccine via the subcutaneous route with a separate disposable syringe.

* Corresponding author: ranifaryal@qau.edu.pk
0030-9923/2022/0001-0001 $ 9.00/0

Goats in group 1 were given 15 grams of mineral mixture for 21 days starting from the day of vaccination. All bucks of group 2 were injected with 5000IU of vitamin A, 2000IU of vitamin D and 20IU of vitamin E every day for consecutive 21 days starting from the day of vaccination. Group 3 goats were dewormed twice the first two days before vaccination than seven days post-vaccination with Fenbendazole at a dose rate of 10mg/kg. Serum, fecal and nasal swabs were collected from all the bucks two days' prior to vaccination and then after vaccination on every seventh day under aseptic conditions. For the cELISA ID Screen® PPR Competition ELISA kit was used. Those samples which had percentage inhibition (PI) values less than or equal to 50 percent are considered to have protective antibody level and above 60 percent do not have a protective level of antibodies against PPRV. Haemagglutination (HA) test of fecal and nasal samples was performed according to the protocol described by Osman *et al*. (2007) using 0.6% washed sheep red blood cell suspension prepared in Phosphate buffered saline (pH 7). Reverse Transcription-Polymerase Chain reaction (RT-PCR) of fecal and nasal samples was performed by QIAJEN one-step RT-PCR Kit (cat. No. 210210) using designed primers of the nucleoprotein (N) gene. The amplified PCR product was confirmed by gel electrophoresis using 1.5% agarose gel. Standard deviation, mean and geometric mean were calculated by using an Excel sheet of Microsoft version 2010 of all the PI values obtained by ELISA plate reader (Multiskan Plus, LabSystem, Finland).

Results and discussion

All goats did not have any humoral immunity against PPRV before vaccination in all the four groups as indicated by the percentage inhibition values in Table I. A week after vaccination group 1 presented the highest standard deviation 16.728, percentage inhibition values and group 2 showed a minimum standard deviation 4.29. But, after the second week trend was slightly changed group 3 showed the highest standard deviation 7.62 of percentage inhibition values (Table II). Overall group 2 demonstrated the most consistent results and group 4 presented the most fluctuating results (Table II). According to the results of this study, goats that were given vitamin A, D and E supplementation developed the protective level of humoral immunity against PPRV within a week after vaccination in contrast to the other goats, which developed protective levels of humoral immunity against PPRV after two weeks. After one week of vaccination, all goats of group 2 developed enough antibody titer to give protection against PPRV. In contrast, only 50 percent of goats of group 1 and 3 goats and 25 percent of group 4 goats developed the protective level of humoral immunity against PPRV. Cipriano *et al*. (1982) also suggested that vitamin E supplementation boosts the humoral immune response in calves and lambs. Mora *et al*. (2008) described the role of vitamin A and D in the enhancement of innate and adaptive immune response. Deworming of goats did not increase antibody titer significantly as compared to goats which were supplemented with vitamins and minerals. These results were unlike the results of Undiandeye *et al*. (2014). Undiandeye *et al*. (2014) suggested that deworming in goats can boost the immune response PPR vaccine in goats. The reason for different results can be due to a lower burden of endoparasites in animals before the start of the trial. The results of the current study are similar to the study conducted by Hanssen *et al*. (2013), in which deworming decreased the immunoglobulin levels in Raptor species.

RT-PCR and HA test of fecal and nasal samples taken from all experimental animals before vaccination and every week after vaccination gave negative results regardless of any group. The present study shows that goats vaccinated by live attenuated PPRV strain Niger 75/1 via the subcutaneous route do not transmit the virus to their surroundings by the nasal or fecal route. These results are similar to the study conducted by Zahur *et al*. (2014) in goats and sheep aged from 5 months to 7 years.

Table I. Geometric means of percent inhibition values of all groups.

Sampling No.	Control group	Mineral supplementation	Vitamin supplementation	Dewormed goats
1st sampling (pre-vaccination)	86.42	83.258	88.25	81.32
2nd sampling	57.42	39.317	25.39	47.31
3rd sampling	33.72	29.810	21.69	32.28
4th sampling	30.45	32.504	18.20	30.84

Table II. Percent inhibition values (Mean±SD) of all groups.

Sampling No.	Control group	Mineral supplementation	Vitamins supplementation	Dewormed goats
2nd sampling	57.42±13.73	42.8±16.728	25.39±4.29	47.31±14.53
3rd sampling	33.72±7.31	26.9±6.3047	21.69±5.33	32.28±7.62
4th sampling	30.45±7.99	33.3±7.793	18.20±6.51	30.84±4.94

Conclusion

Humoral immune response in goats was shown to be triggered to develop more antibodies against the PPR vaccine in less time by supplementation of vitamins and minerals.

Acknowledgments

We are thankful to Dr. Muhammad Javed Arshad, Dr. Muhammad Afzal, and all the support staff at Virology Laboratory at the National Veterinary Laboratory.

Statement of conflict of interest

The authors have declared no conflict of interest.

References

Abubakar, M., Irfan, M. and Manzoor, S., 2015. *J. Anim. Sci. Technol*., **57**: 32. https://doi.org/10.1186/s40781-015-0066-0

Abubakar, M., Jamal, S.M., Khan, M.A. and Ali, Q., 2008. *Res. J. Vet. Sci*., **1**: 56–61.

Cipriano, J.E., Morrill, J.L. and Anderson, N.V., 1982. *J. Dairy Sci*., **65**: 2357–2365. https://doi.org/10.3168/jds.S0022-0302(82)82509-5

Hanssen, S.A., Bustnes, J.O., Schnug, L., Bourgeon, S., Johnsen, T.V., Ballesteros, M., Sonne, C., Herzke, D., Eulaers, I., Jaspers, V.L.B., Covaci, A., Eens, M., Halley, D.J., Moum, T., Ims, R.A., and Erikstad, K.E., 2013. *Ecol. Evol*., **3**: 5157–5166. https://doi.org/10.1002/ece3.891

Mora, J.R., Iwata, M. and von Andrian, U.H., 2008. *Nat. Rev. Immunol*., **8**: 685–698. https://doi.org/10.1038/nri2378

Munir, M., Zohari, S., Saeed, A., Khan, Q.M., Abubakar, M., LeBlanc, N. and Berg, M., 2011. *Transb. Emerg. Dis*., **59**: 85–93. https://doi.org/10.1111/j.1865-1682.2011.01245.x

Osman, N.A., Abdul-Rahman, M.E., Ali, A.S. and Fadol, M.A., 2007. *Trop. Anim. Hlth. Prod*., **40**: 363–368. https://doi.org/10.1007/s11250-007-9106-1

Undiandeye, U.J., Oderinde, B.S., El-Yuguda, A. and Baba, S.S., 2014. *World J. Vaccines*, **4**: 88–95. https://doi.org/10.4236/wjv.2014.42011

Zahur, A.B., Irshad, H., Ullah, A., Afzal, M., Latif, A., Ullah, R.W., Farooq, U., Samo, M.H. and Jahangir, M., 2014. *J. Biosci. Med*., **2**: 27–33. https://doi.org/10.4236/jbm.2014.26005