Factors for Increasing Goat Productivity with Probiotic Supplements in Kalipuro and Pesanggaran, Banyuwangi

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ABSTRACT

Goat farming is an economic sector asset to support food availability and security in Banyuwangi. The existence of livestock is mainly to be supported by the adequacy of feed in order to increase productivity. This study is to evaluate the factors that play a role in increasing livestock productivity by adding probiotics to feed. The method used is surveys and questionnaires to farmers to evaluate farmers' understanding of feed quality. The results of 45 farmers as respondents, reported factors of knowledge ($p<0.000$), age ($p<0.000$), and application of feed ($p<0.000$) which significantly affect livestock productivity. It can be concluded that the level of knowledge, age, and application of feed are crucial factors for farmers to increase livestock productivity.
Keywords: Factors, productivity, goat, probiotics

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INTRODUCTION

Based on various studies, it has been revealed that many of the mechanisms of action of probiotics reported are the results of in vitro experiments. Therefore, these results must be confirmed by in vivo studies. The effects of probiotics can be classified into three modes of action, namely probiotics may be able to modulate host defenses including innate and innate immune systems. This mode of action is most likely important for the prevention and therapy of infectious diseases but also for the treatment of (chronic) inflammation of the digestive tract or its parts. In addition, this probiotic action could be important for eradication of neoplastic host cells (Hamid et al., 2020).

Probiotics can also have a direct effect on other microorganisms, commensals and/or pathogens. This principle is in many cases important for the prevention and treatment of infections and the restoration of microbial balance in the gut. Finally, probiotic effects may be based on actions affecting microbial products such as toxins, host products, e.g. bile salts and foodstuffs. Such actions may result in inactivation of toxins and detoxification of host and dietary components in the gut. All three modes of action of probiotics are most likely involved in infection defense, cancer prevention and in stabilizing or re-establishing the physiological balance between the gut microbiota and its host (Hartono and Kurtini, 2015).

However, it must be emphasized that there does not appear to be a single probiotic that exhibits all three of these principles, at least not to the extent that it can be used as a drug for the prevention or treatment of all the diseases mentioned. It depends on the nature of the metabolism, the type of surface molecules to be expressed and the components to be secreted, the probiotic actions that a particular probiotic strain might exhibit. The era of the re-emergence of zoonotic diseases or re-emerging diseases requires more efforts to complete and increase

livestock immunity through proper nutritional intake (Haryati, 2011).

METHOD

The study was carried out in Kalipuro and Pesanggaran sub-districts. A total of 45 breeders as respondents were collected in a focus group discussion. Each breeders was given questionnaire questions to answer on aspects: level of understanding, age, level of education, number of goats, type of feed, feed processing methods, and stable management. Each question is answered on a Likert scale by giving points 1-5. Each breeders received assistance from the research team to answer and understand each question so as to avoid bias during the study.

All results were tabulated in the form of nominal data and then analyzed by Chi Square test with SPSS v25 software (IBM, USA).

RESULT AND DISCUSSION

On the first day, initial socialization was carried out with partners on the topic of feed processing with probiotics and discussions on strategic disease control, especially epidemic foot and mouth disease. On the second day, the practice of making and processing feed with probiotics was carried out.

The pretest is given before the participants receive counseling material from the extension worker, while the posttest is given after the participants receive the counseling material from the extension worker. The pretest and posttest contain questions regarding livestock, ruminant probiotics and their uses which aim to find out how far the extension participants can absorb the material provided by the extension workers. The pretest and posttest questions contain the same questions. The affective aspects tested included knowledge of the meaning, function, composition of ingredients, and the use of probiotics. The cognitive aspects tested included understanding the time of use and the probiotic formula. The psychomotor aspects tested included skills and skills in processing feed using probiotics. To maintain the sustainability of the program, cadres have been formed which are also incubator village cadres so that during program implementation they can be monitored so that the community can apply probiotic processing independently (Table 1).

Table 1. Factors that play a role in livestock productivity

Factors	n	P-value
Understanding		0,087
Yes	21	
Moderate	22	
No	2	
Age		0,000***
21-30 yo	7	
31-40 yo	12	
41-50 yo	21	
>50 yo	5	
Education		0,000***
No	2	
Formal school	38	
High education	5	
Number of goats		0,142
1-5	4	
6-10	38	
>10	3	
Feeding		0,061
Green feeder	39	
Mix	4	
Concentrate	2	
Feed technology		0,000***
Yes	20	
No	25	
Stable management		0,068
Semi Modern	7	
Traditional	38	

*** p<0,001, ** p<0,01, * p<0,05

According to Mardikanto (1993) that age is one of the main factors that plays a very important role in the process of conveying information, learning efficiency, level of physical and emotional maturity, interest in learning and motivation to learn as the target of counseling. A person's learning capacity generally develops rapidly until the age of 20 years and decreases, reaching its peak until the age of 50 years. A person's learning ability will decrease after maturity reaches the age of 55-60 years. According to Winarso (2009) the selection of the type of goat is adjusted to what is usually raised by the local community, generally the breeders produce the seeds themselves. This also facilitates the acquisition of seeds and maintenance because breeders are used to it. The selection of this type of goat is also related to the availability of feed, because almost all breeders still use natural grass as feed. According to Winarso (2009) In goat farming, the main production facilities that should be available are livestock seeds, forage (forage), concentrates and livestock medicine. In reproductive technology, only 6 livestock groups or 23% use artificial insemination, while 20 livestock groups or around 77% still rely on natural mating. According to Sutama (2004) the low pregnancy rate obtained in AI goats and other technical reasons may be one of the factors that led to the application of AI in goats.

Goats are less developed in society. However, this technology has a significant contribution in increasing livestock productivity, especially in utilizing superior males. Only 8 livestock groups or around 31% used feed technology in applying feed technology, while 18 livestock groups or around 69% did not use feed technology for their goat farms. According to Hanafi (2008) the purpose of feed processing is to increase the profit of changing particle size, changing water content, changing feed density, increasing palatability/acceptability, changing nutrient content, increasing nutrient availability, detoxifying, maintaining quality during storage and reducing contamination. There are 3 livestock groups that use tool technology or around 12% who already use tool technology in the form of grass cutters, while 23 livestock groups or around 88% do not yet use tool technology. There are 5 groups of livestock that have used waste treatment technology or around 19% which have processed livestock waste into fertilizer or biogas, while 21 groups of livestock or around 81% have not used waste treatment technology.

Probiotics can affect the immune system by products such as metabolites, cell wall components and DNA. Obviously, immune modulating effects can even be achieved with probiotic bacteria or only probiotic derived components such as peptidoglycan or DNA fragments. Probiotic products are recognized by host cells that are sensitive to this because these products, for example, are equipped with receptors. Therefore, the main target cells in that context are intestinal epithelium and gut-associated immune cells. The interaction of probiotics with host (epithelial) cells by adhesion itself may already trigger signaling cascades leading to immune modulation. Alternatively, release of soluble factors can trigger signaling cascades in immune cells or epithelial cells that then affect immune cells. Direct adhesion of probiotics to host epithelial cells has been demonstrated in many in vitro experiments (Djunaedi, 2013).

However, the superiority of probiotic and commensal bacteria to intestinal epithelial cells in vivo has not been demonstrated. Instead, the bacteria only attach to and invade the outer mucous layer but do not reach the

epithelial cells themselves. One exception is the uptake and transcytosis of bacteria by M-cells, which collect low levels of gut luminal antigens, here bacteria, and pass them on to dendritic cells in the subepithelial dome region (Kompiang, 2009). Another direct contact between probiotics and host cells in the gut occurs with internalization of bacteria by dendritic cells localized beneath the epithelial cells (non-M cells). These cells are also capable of collecting antigen from the intestinal lumen by their dendrites by extending these dendrites through the epithelium into the intestinal lumen. Ex vivo studies with human monocyte strains matured in the presence of Lactobacillus rhamnosus were used to instruct TCD4+ cells. These T-cells show decreased proliferation and production of cytokines (IL-2, IL-4, IL-10) when responding normally to IL-2 (Hamid et al., 2021).

Teichoic acid, a Gram-positive cell wall component, from L. plantarum is involved in the anti-inflammatory activity of this probiotic. A mutant with increased anti-inflammatory capacity incorporated less D-ala in teichoic acid than the wildtype strain and dramatically reduced the secretion of pro-inflammatory cytokines by peripheral blood mononuclear cells and monocytes resulting in a significant increase in IL-10 production. The observed effects are clearly TLR-2 dependent. This mutant is also more protective in murine colitis models than its wildtype counterpart. This study elegantly demonstrates the involvement of TLR-2 in the probiotic effects of L. plantarum highlighting the importance of TLRs for probiotic action (Lestari and Helmyati, 2018).

However, probiotics are also capable of protecting the integrity of the intestinal mucosal barrier against the destructive action of enteropathogenic *Escherichia coli* in a TLR-independent manner. They achieved this by altering protein kinase C signaling resulting in amplified expression and redistribution of zonula occludens protein 2 (ZO-2) in T84 cells. This is very plausible because ZO-2 is an important factor for maintaining tight junction function in the intestinal epithelium. Induction by probiotic *E. coli* strains of ZO-2 as well as expression of ZO-1 in vivo was demonstrated in a mouse model. EcN was even able to protect mice with dextran sodium sulfate-induced colitis by reducing weight loss and shortening of the colon as a consequence of improved intestinal barrier function (Widiyaningsih, 2011).

CONCLUSION

It can be concluded that the level of knowledge, age, and application of feed are crucial factors for farmers to increase livestock productivity.

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