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Analysis of the Role of Nutrition and Feed Composition on Goat Growth and Productivity

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Abstract

Goat farming is one commodity that has promising economic potential. Efforts to achieve optimal growth and productivity of goats, proper nutrition and feed composition are needed. The purpose of this study was to analyze the nutritional needs and optimal feed composition for goat growth and productivity. This study used qualitative research methods. Data collection techniques were conducted with literature studies and goat breeder interviews. The data that has been collected is then analyzed through three stages, namely data reduction, data presentation and conclusion drawing. The results showed that farmers have several strategies to meet nutritional needs and feed composition to achieve optimal goat growth and productivity, including paying attention to nutritional needs, following nutritional standards, using forage, supplementing and scheduled feed. These efforts are proven by goat farmers in Arjasari that the development and productivity of goats become optimal.

Keywords: *Nutrition, Composition, Feed, Growth, Productivity, Goat.*

INTRODUCTION

Meat is one of the livestock commodities that is a mainstay source of animal protein and is very supportive to meet the basic needs of food in Indonesia. Meat is divided into two types, namely large livestock meat such as cattle and buffalo, and small livestock meat such as sheep, goats, and pigs (Zhang et al., 2017). The demand for goat meat and processed goat products continues to increase both in the local and international markets (Gani et al., 2022). In 2010, goat meat was consumed by more than 70% of the world's population, making up 60% of red meat consumption. Goat meat is an important food of the population in Africa, Asia, Central America and South America. China, India and Nigeria are the largest producers and consumers of mutton. Historically, goat meat was less consumed in the United States, Canada and Western Europe but its consumption increased with more immigrants from Asia, Africa and Latin America (Miller &; Lu, 2019). Goat farming in Indonesia is one of the commodities that has promising economic potential. Goat livestock is an animal that can develop and survive in various agroecological zones and has a close relationship with the farming system. In many developing countries, goat livestock has been considered a strategic commodity that can help overcome poverty, this is also supported by international institutions (Lohani & Bhandari, 2021).

Goat is a source of animal protein that is in demand by many consumers because of its high nutritional content and distinctive taste. In addition to meat, goat farms also produce

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other products such as milk, leather, and fur. These products have high economic value and have wide market potential. Goat milk, for example, has a higher nutritional content compared to cow's milk and is increasingly in demand by health-conscious consumers (Sawitri, 2012). In addition to economic potential, goat farming also has a fast reproduction cycle, so it can provide profits in a relatively short period of time. Goats have the ability to multiply quickly, produce healthy and ready kids for sale in a relatively short time.

The benefits of goat farming need to be maximized in order to achieve optimal goat growth and productivity. Efforts to achieve optimal growth and productivity of goats require serious attention to the nutrition and composition of feed given to goats. Proper nutrition and proper feed composition will have a significant impact on the health, growth and productivity of goats.

In general, there are several basic nutrients needed by goats, such as dry matter as much as 0.23% of weight, crude protein 14.4%, energy 2.63 Mcal EM / kg, and 70% forage from total feed (Rachman, 2022). While the composition of feed varies depending on the phase of growth, purpose of maintenance (for example, meat or milk production), health conditions, and environmental factors.

In previous research conducted by (Godoy et al., 2018) Optimization of goat productivity is carried out by utilizing fermented agricultural waste. In another study conducted by (Daniel et al., 2019) Growth productivity is carried out with silage feed. In previous studies, the composition of feed and nutrition was discussed in separate studies with different objects, so the novelty of this study was the combination of discussion of nutritional needs and feed composition for goat growth and productivity. The purpose of this study was to analyze the nutritional needs and optimal feed composition for goat growth and productivity. This study used qualitative research methods.

RESEARCH METHODS

This study used qualitative research methods. According to Sugiyono, (2018) Qualitative research method is a research method based on philosophy used to examine scientific conditions (experiments) where researchers as instruments, data collection techniques and qualitative analysis emphasize meaning. The data collection technique was carried out by literature study obtained from Google Schoolar and interviews of 10 goat farmers in Arjasari Village, Bandung Regency. The data that has been collected is then analyzed through three stages, namely data reduction, data presentation and conclusions.

DISCUSSION

The ability of a livestock to be able to consume feed ingredients depends on the forage given, the better the quality given, the better the level of consumption (Kusrianty &; Nuraidil., 2020). Feed is an edible food ingredient and does not harm the body of livestock. Feed provides nutrients that are essential for life, production, and reproduction. In livestock cultivation management, especially ruminants, feed is the highest need so it needs attention in its provision both in terms of quantity and quality (Alabi et al., 2013).

The role of feed in the livestock sector is very important because it is an inseparable part and is the key to the success of livestock production because animal husbandry is one of the sectors that plays a very important role in people's lives from upstream to downstream including food, clothing, and industry (Son, 2021). The feed needs of each livestock vary according to the type, age, body weight, environmental conditions and physiological conditions of livestock. Feed must contain all the nutrients needed by the body of livestock, but still in a balanced amount. Nutrients needed by livestock include

carbohydrates, fats, proteins, vitamins, water and inorganic elements and minerals (Hynd, 2019).

Nutrients or nutrients are any elements or chemical compounds that have specific functions that can support the life processes of cells or organisms. Nutrients or nutrients are any elements or chemical compounds that have specific functions that can support the life process of cells or organisms. There is a close relationship between living organisms and the environment that is food. This close relationship begins when organisms enter food into the body followed by chemical processes and faali, so that all or part of the incoming food can be used for various purposes, namely, living, growing, multiplying or producing, while the rest of the unused food is immediately removed from the body (Darmayani, 2021). This also applies to goats.

Goats are small ruminants that are relatively easy to maintain and can eat a variety of forage, especially young leaves. Goats can live adaptably to areas where other livestock are difficult to live such as in rocky areas, hilly areas or mountainous areas (Monteiro et al., 2017). But Meeting the needs of feed in goats, not only by giving forage or concentrates because this pattern of feeding has not been able to meet the needs of goats. In addition to grass and concentrates, goats also need other food substances in small quantities, namely vitamins and minerals. Minerals and vitamins are important elements in the metabolic processes of livestock (Lima et al., 2018).

Proper nutrition and a balanced feed composition are necessary for optimal growth and health of goats. Feeding that contains all the nutrients needed by goats, such as protein, energy, vitamins, and minerals, will help goats grow well, maintain ideal body weight, develop a strong immune system, and prevent disease. The nutritional needs of goat feed consist of basic life needs and needs for production (Darmayani, 2021). The nutritional needs of goats based on body weight and weight gain and composition of feed ingredients, energy sources and protein sources according to Ginting, (2009) are shown in the table below.

Table 1 Nutritional Needs of Goats

Weight (kg)	PBBH (g)	BK (g)	TDN (%)	Protein (%)	Ca (%)	P (%)
0-10	0-25	320	16	17	0,9	0,7
	25.1-50	360	21	22	1,2	0,9
	50.01-75	370	25	26	1,5	1,2
	75.01-100	350	3	31	1,9	1,5
10.01-20	0-25	440	22	17	1,2	0,9
	25.1-50	450	24	22	1,5	1,1
	50.01-75	500	31	2	1,9	1
	75.01-100	500	36	31	2,2	1,7
20.01-30	0-25	540	27	17	1,5	1,1
	25.1-50	580	32	22	1,8	1,3
	50.01-75	600	72	12,39	2,1	1,6
	75.01-100	1300	41	11	0,37	0,23
30.01-40	0-25	640	32	33	1,8	1,3
	25.1-50	680	37	38	2,1	1,5

	50.01-75	710	41	43	2,4	1,8
	75.01-100	730	46	42	2,7	2,1
40.01-50	0-25	740	37	38	2,1	1,5
	25.1-50	770	41	41	2,4	1,7
	50.01-75	800	46	40	2,7	2
	75.01-100	830	51	22	3,1	2,3
50.01-60	0-25	910	46	5	2,5	1,9
	25.1-50	950	3	43	2,8	2,1
	50.01-75	980	55	58	3,1	2,4
	75.01-100	1700	6	9,3	0,24	0,23
60.01-70	0-25	920	47	49	2,6	2
	25.1-50	960	6	53	2,8	2,2
	50.01-75	990	55	58	3,1	2,5
	75.01-100	1200	6	62	3,5	2,7
70.01-80	0-25	930	48	48	2,7	1,8
	25.1-50	950	5	53	2,8	2,1
	50.01-75	980	56	58	3,1	2,4
	75.01-100	1000	8	62	3,6	2,8
80.01-90	0-25	950	46	48	2,5	1,9
	25.1-50	950	7	54	2,9	2,2
	50.01-75	980	57	59	3,2	2,5
	75.01-100	1110	8	65	3,6	2,9
90.01-100	0-25	910	46	48	2,5	1,9
	25.1-50	950	8	53	2,8	2,4
	50.01-75	980	55	58	3,1	2,6
	75.01-100	1210	9	67	3,8	2,9

Source: Sutrisno, (2015)

Proper and quality feeding should be carried out consistently. If the feeding is not done consistently, it will result in the growth of the goat is disrupted. This often happens especially in tropical countries, such as Indonesia, where in general animal feed given during the dry season has a lower quality than animal feed given during the rainy season. Thus, the growth of domestic goats will experience an up and down curve, during the dry season livestock growth will decrease, while in the rainy season livestock growth will increase rapidly, because the feed given meets the required requirements.

In the dry season, there is usually a decrease in energy, minaral, and protein contained in forage feed due to forage plants experiencing water shortages, even in that season there is often a shortage of feed volume due to the scarcity of forage feed ingredients. Thus, the feed given at the time of the dry season is often unqualified and of poor quality.

Conditions like this result in stunted livestock growth, in adult goats will experience weight loss and a low percentage of carcass. In addition, livestock breeding will also decrease due to a decrease in fertility (Dikeshewan, 2013).

Therefore, the farmer or goat cultivator must provide feed that meets the requirements for goat growth. Qualified and quality feed is feed containing proteins, carbohydrates, fats, vitamins, minerals and water. Such feed can be provided in the form of forage and concentrates. Here are the nutrients in goat feed ingredients.

Table 2. Nutrition of Goat Feed Ingredients

Feed Ingredients	BK (%)	PK (%)	SK (%)	TDN (%)	Ca (%)	P (%)
Elephant Grass	21	10	-	89	-	-
Bengal grass	20	8,7	34,6	50	0,7	0,2
Fresh Rendeng	35	15,1	22,7	65	1,51	0,2
Cassava Leaves	23	17	-	81	-	-
Lamtoro leaves	29	22,3	14,4	-	2,1	0,01
Fresh Gamal Leaves	25	24,3	18	65	0,6	0,2
Field grass	36	6,7	34,2	-	-	-
Kaliandra Leaves	39	24	-	-	1,6	0,2
Rice Bran	88,4	13,4	11	-	-	-
Rice straw	86	4,4	-	52	-	-
Corn bran	86	13,8	5	74	0,2	1,2
Wheat bran	86	15	15,7	70	0,15	1,23
Yellow Corn	86	10,3	1,4	80	0,02	0,33
Cassava	86	1,7	1,6	69	0,1	0,04
Onggok	86	2,2	26,9	65	0,68	0,05
Cantel (Sorghum)	86	11,2	2,8	80	0,19	0,2
Cornstarch	90	6,6	3	87	0,2	0,2
Fish Meal	86	44,8	-	75	-	-
Drip	86	4,2	0	53	0,71	0,07
Soybean meal	86	45	5,1	78	0,2	0,74
Pollard	91	16,5	10	70	0,14	0,32
Peanut Meal	86	49,5	5,3	65	0,11	0,74
Coconut Meal	86	21,6	10,2	66	0,08	0,67
Kapok Meal	86	31,7	24	74	0,47	0,97
Cotton Meal	86	44,2	15,8	66	0,22	1,34
Palm Oil Meal	86	20,4	9	80	0,31	0,85

Source: Sutrisno, (2015)

The fulfillment of ruminant animal feed needs is influenced by seasonal factors whose availability of feed ingredients is influenced continuously throughout the year so that it is expected that the use of gamal plants as crops that produce throughout the season can be a solution to the forage feed crisis. Goat feed needs based on dry matter are 4% of body weight. In general, goats in the fattening phase range from 25 kg so that goat feed needs based on dry matter are 365 kg / head / year. The capacity of gamal leaves from the production of 15,880 kg / hectare / year of dry matter is 44 goats / year. The availability and continuity of animal feed is the most important factor for increasing goat production and productivity (Gaspar et al., 2011). Meanwhile, the Good Feed Manufacturing Guidelines (CPPB) is a guide used by individuals or feed producers to ensure the quality and safety of the feed they produce. The purpose of these guidelines is to protect consumers and farmers from losses caused by low-quality feed. If the feed does not meet the Indonesian National Standard (SNI) or Minimum Technical Requirements (PTM), then farmers can experience losses in livestock production and productivity that do not reach optimal levels. SNI is a standard that applies nationally in Indonesia and has an important role in encouraging the competitiveness of national products and protecting the domestic market from goods with low standards. In accordance with the Regulation of the Minister of Agriculture Number 15 of 2021 and Regulation of the Minister of Agriculture Number 22/Permentan/PK.110/6/2017, circulating commercial feed must be registered to ensure conformity with quality standards or minimum technical requirements (Arimbi, 2022).

Arjasari is a sub-district in Bandung Regency, West Java province, Indonesia. Arjasari is located 20 km south of Bandung City or about 19 km from the capital of Bandung Regency, Soreang. The land contour of Arjasari District is relatively hilly because it is located at the foot of Mount Malabar. A flat area is located at the northwestern end of the sub-district, namely in the villages of Batukarut and Lebakwangi. Both villages are traversed by the Bandung-Banjaran highway. The type of goat raised in Arjasari Village varies depending on the preferences and goals of the breeder. However, some types of goats that are generally raised in the area include:

1. Peanut Goat

Peanut goat is one type of goat that is popular in Indonesia. They have a small to medium body, blackish-brown fur, and characteristic erect ears. Peanut goats are known to have good adaptation to rural environments and are resistant to extreme weather conditions.

2. Boer goats

Boer goats originated in South Africa and became a favorite in commercial farming. They have a large body size, good meat and rapid growth. Boer goats have white fur with brown patterns on the head and neck

3. Etawah Peranakan Goats

Etawah Peranakan goats or often referred to as PE are the result of a cross between Peanut goats and Etawah goats. They have a medium body size, tend to be large, and have a good growth rate. PE goats are known to have tasty and productive meat in terms of reproduction.

4. Etawah Goat

Etawah goat, also known as PE goat (Etawah Cross), is a native Indonesian goat originating from the Etawah area, Central Java. They have a large body, tend to be well-built, and short fur. Etawah goats are known to have fast growth and are suitable for commercial farming.

The results of interviews with 10 goat farmers in Arjasari, found that farmers have several strategies to meet nutritional needs and feed composition to achieve optimal goat growth and productivity. The breeders conduct an analysis of the nutritional needs of goats based

on the growth phase and maintenance goals. The breeders in Arjasari use references that refer to nutritional standards to calculate the amount and type of nutrients needed. For example, in the growth phase, goats need a higher level of protein, in the milk production phase, energy and calcium needs increase.

Breeders ensure the selection of high-quality feed rich in nutrients. Breeders use fresh forages such as grass or legumes, good quality hay, and concentrates containing essential nutrients such as protein, energy, fiber, vitamins, and minerals. For example, farmers provide elephant grass, alfalfa, and corn as the main feed, and provide concentrates containing a mixture of wheat, corn, and bran. Farmers also provide additional feed supplements to ensure goats get optimal nutrition. These supplements can be vitamins, minerals, or additional protein. For example, farmers provide mineral salts, calcium, phosphorus, and vitamin A as supplements to meet the needs of goats. Farmers in Arjasari also provide feed on a scheduled and consistent basis in the morning and evening with sufficient quantities to meet the daily needs of goats.

The efforts made by goat farmers in Arjasari have proven effective in increasing the development and productivity of goats to be optimal. Some evidence that shows the success of this effort includes:

1. Good growth

Goats that are given feed with the right and balanced nutritional composition experience optimal growth. Goats have a body weight corresponding to their age and growth phase.

2. Good health

Goats that get feed rich in nutrients have a strong immune system and are more resistant to disease. This helps maintain the overall health and quality of life of goats.

3. High productivity

Proper feeding also contributes to an increase in goat productivity. Goats that are given feed with the right composition produce more milk or meat and quality.

4. Feed efficiency

Feeding in accordance with nutritional needs, farmers can maximize the efficiency of feed use. Goats can digest and utilize nutrients well, thereby reducing feed wastage and costs incurred by farmers.

5. Livestock business sustainability

Observing optimal nutrition and feed composition, goat farmers in Arjasari have succeeded in maintaining the sustainability of their livestock business. Goats remain healthy and productive in the long run, which results in consistent profits for the farmer.

A concrete example of this success is goat farmers in Arjasari who reported an increase in goat growth and production after applying the right feed composition. They observed that their goats grew better, produced more milk or meat, and had optimal health. This provides evidence that efforts in meeting nutritional requirements and feed composition play an important role in improving overall goat development and productivity.

These results are supported by research (Fiala, 2008) which states that animal feed plays a major role in meeting basic living needs, livestock growth, and production that can be produced in the form of meat. Good feed must meet the criteria of high nutrition, economical, easily available, as well as the availability of continuity. With the need and composition of good feed, goat livestock also has an impact on the farmer's economy. Goat livestock plays a role in the economy of farmers in rural areas because of fast breeding and forage feed that is easily available (Lovreglio et al., 2014).

CONCLUSION

Based on the results of the study, it can be concluded that farmers have several strategies to meet the nutritional needs and feed composition in order to achieve optimal goat growth and productivity. The breeders conduct an analysis of the nutritional needs of goats based on the growth phase and maintenance goals. The breeders in Arjasari use references that refer to nutritional standards to calculate the amount and type of nutrients needed. Breeders ensure the selection of high-quality feed rich in nutrients. Breeders use fresh forages such as grass or legumes, good quality hay, and concentrates containing essential nutrients such as protein, energy, fiber, vitamins, and minerals.

The importance of farmers providing additional feed supplements to ensure goats get optimal nutrition. These supplements can be vitamins, minerals, or additional protein. The important role of providing nutrition and feed composition in goats is to optimize growth and productivity in the goats themselves. In addition, farmers in Arjasari also provide feed on a scheduled and consistent basis in the morning and evening with sufficient amounts to meet the daily needs of goats. This effort is proven by goat farmers in Arjasari that the development and productivity of goats are optimal.

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