

## Small-holder Goat Farmer Profile Demographic-based on Financial Aspect in Majene Regency, West Sulawesi Province

Muhammad Iqbal Rivai<sup>1</sup>, Siti Nurlaelah<sup>2,\*</sup> and Tanrigiling Rasyid<sup>3</sup>

<sup>1</sup>Master Programme in Animal Science and Technology, Faculty of Animal Science, Hasanuddin University, Makassar, South Sulawesi Province, Indonesia; <sup>2</sup>Socio-Economic Department, Faculty of Animal Science, Hasanuddin University, Makassar, South Sulawesi Province, Indonesia; <sup>3</sup>Socio-Economic Department, Faculty of Animal Science, Hasanuddin University, Makassar, South Sulawesi Province, Indonesia

\*Corresponding author's e-mail: [lelaysf@gmail.com](mailto:lelaysf@gmail.com)

Generally, goat farming in Majene Regency is traditionally managed, with relatively low average livestock ownership. This study aims to classify the demographic profile based on the R/C ratio value to identify groups of farmers who need special attention. This approach allows for more targeted policy development, resulting in more efficient use of resources, increased profitability, and a positive impact on the economy of goat farmers. The sampling method used the limited population formula, resulting in 123 farmers. A simple random sampling method was used, and the data collection method used a survey technique. *K-mean* cluster analysis was performed to classify farmers into three groups. The results obtained are in the form of several points described as follows: (1) technical efficiency related to physical strength, (2) business efficiency does not depend on formal education, (3) productive age and experience can increase efficiency, (4) efficiency is not maximized due to traditional management and (5) livelihoods of farmers affect the scale of ownership. This finding emphasizes the need for empowerment for women farmers, such as forming a Farmer Women Group (FWG). For goat farmers who consider traditional methods to optimize efficiency, counseling and training are needed. For goat farmers who consider traditional methods to maximize efficiency, counseling and training are needed. More detail, a pilot or fostered goat farm with easy, efficient and profitable management is needed based on technology so that farmers who still make raising livestock a side job are more confident and switch to focus more on goat breeding activities.

**Keywords:** Demographic, goat, farmer, efficiency, cluster, policymaker, Majene.

### INTRODUCTION

Goats are one of the commodities with many advantages, including rapid development and growth, requiring relatively small capital, and easy maintenance (Singh *et al.*, 2021; Butani *et al.*, 2023) Therefore, smallholder farmers widely carry out goat farming as their main livelihood, especially in rural areas in Indonesia, a developing country. Goats make a significant contribution to the lives of farmers. In addition to being a source of protein, goats can also improve welfare because they can be allocated as a source of income (Peacock, 2008; De Vries, 2008; Tatipikalawan, 2017). In addition, goats are used as savings or future investments, a measure of social status, a source of employment, customary needs in some regions, as well as a fertilizer producer for food crops in rural (Moyo and Swanepoel, 2010; Singh *et al.*, 2021)

One of the regions in Indonesia, namely Majene Regency in West Sulawesi Province which, has the potential as a goat livestock development area (Susanti *et al.*, 2020). According to data from the Central Statistics Agency, Majene Regency has the second-largest goat population in West Sulawesi, with 77,194 in 2023 (BPS-Statistics Majene Regency, 2024). One of the areas with the potential for goat development is due to its strategic location and promising feed (Hamarong *et al.*, 2018).

Behind its potential is that goat farms in Majene Regency are managed traditionally, with relatively low average livestock ownership, and are spread and have limited capital (Suhartina *et al.*, 2017). This condition leads to low productivity and no guarantee of business sustainability (Yaqin *et al.*, 2022). It is feared that it will impact farmers' economic development if not handled. Therefore, the proper steps are needed to

improve the condition of goat farming in Majene Regency and maximize the potential of the local economy.

However, often the policies formulated are not well-targeted due to a lack of understanding of the real needs in the field due to the specific characteristics of farmers that are not adequately taken into account (Elieser *et al.*, 2012; Pakpahan *et al.*, 2015; Lendrawati *et al.*, 2023). Demographic factors such as gender, age, education, experience, and scale of ownership can affect the decision-making process, resource allocation, and overall success in goat farming (Nurchahyo *et al.*, 2022). Understanding the characteristics of goat farmers can lead to targeted interventions and support programs to improve the overall well-being and sustainability of goat farming (Jegoda *et al.*, 2022).

One of the leading indicators in assessing the economic efficiency of goat farming is the profit/cost ratio (Revenue/Cost, or R/C). This ratio provides an overview of profitability, showing the accumulated revenue generated for each unit of cost incurred. Analysis of the R/C ratio can reveal whether a goat farm is operating efficiently or facing challenges that could threaten its sustainability (Tsiouni *et al.*, 2021). Classifying the demographic profile of goat farmers based on R/C ratio values could be an innovative approach that helps decision-makers and stakeholders design more targeted interventions to improve the profitability and sustainability of goat farms.

Considering the diverse characteristics of goat farmers, information needs to be taken into consideration for policymakers in formulating the right and correct policies according to the needs of goat farmers. Therefore, this study aims to classify demographic profiles based on R/C ratio values to identify groups of farmers who need special attention. This approach allows policymakers to provide more targeted interventions, resulting in more efficient use of resources, increased profitability, and a positive impact on the economy of goat farmers.

## MATERIALS AND METHODS

**Study Location:** This research was conducted for three months, from August to October 2023, in Majene District, West Sulawesi Province. Majene Regency consists of 8 sub-districts, 20 urban villages, and 62 villages with a total population of 175.78. Geographically, Majene Regency has an area of 947.84 km<sup>2</sup> located at 2°38' - 3°38' South latitude and 118°45' - 119°4' East longitude. This location was chosen because goat farming has become an essential economic driver for farmers in Majene Regency, so this area has the second-largest goat population in West Sulawesi Province. This area has long been known as a producer of goats with large numbers and sound quality in West Sulawesi (Susanti *et al.*, 2020).

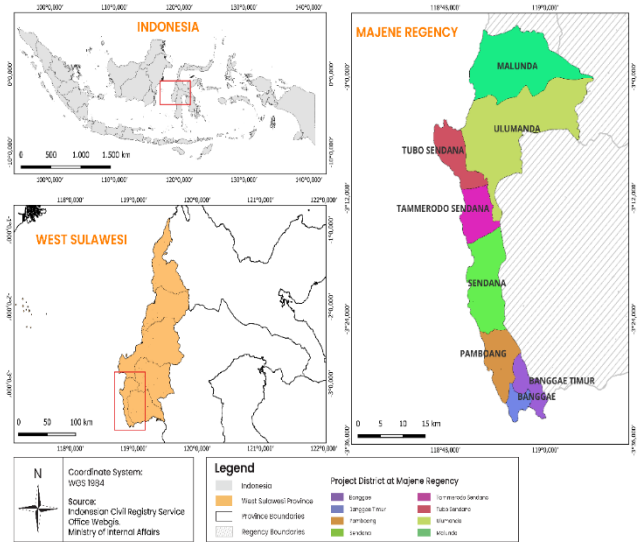


Figure 1. Study Area

**Sample and Sampling:** Based on the results of the latest agricultural census, there are 5,614 goat farmers spread across eight sub-districts in Majene Regency (BPS-Statistics Majene Regency, 2023). This study focuses on farmers who have raised goats for at least three years because they are considered experienced enough. The number of farmers to be sampled in this study was determined using a special formula for a limited population (Murray and Larry 2009; García *et al.*, 2023). With a confidence level of 95% and considering other factors such as success rate and fault tolerance, the researchers decided to sample as many as 123 farmers to be sample in this study.

$$n = \frac{N * Z_{\alpha}^2 * p * q}{e^2 * (N - 1) + Z_{\alpha}^2 * p * q}$$

Where, n = sample size, N = population size (5.614 goat farmer), = confidence level of 95%, Ze = error estimate of 7%, p = probability of success is 80%, q = probability of error is 20% (1-p).

A simple random sampling method was used, and the data collection method used a survey technique. The data collected consisted of primary and secondary data. Primary data was obtained through interviews with farmers using questionnaires. Secondary data comes from various related information sources, such as journals, articles, research reports, and regency annual report documents.

**Data Analysis:** This study uses quantitative data analysis using a particular formula to obtain the value of revenue per cost (R/C ratio). The process is described as follows:

1. The total income of the goat farming business can be known using the formula (Soekartawi, 1995):

$$\pi = TR - TC$$

Description,  $\pi$  = Total Income (Rp/year), TR = Total Revenue (Rp/year), TC = Total Costs (Rp/year)



2. The acceptance in this study comes from changes in livestock value, livestock sales, and waste. The total revenue of the goat farming business can be known using the formula:

$$TR = P \times Q$$

Description, TR = Total Revenue or total revenue (Rp/year), Q = Number of production (head/year), P = Production price (Rp/head)

3. Fixed Costs consist of cage depreciation costs, equipment depreciation costs, land and building. Variable costs include fuel, water, electricity, medicine, vitamins, vaccines, and animal feed. To find out the total production cost of goat farming business, you can use the formula:

$$TC = FC + VC$$

Description, TC = Total Cost (Rp/year), FC = Fixed Cost (Rp/year), VC = Variable Cost (Rp/year)

4. Revenue divided cost (R/C Ratio)

$$\frac{R}{C} = \frac{Pq}{TFC - TVC}$$

Remarks, R = Revenue, C = Cost, Pq = Price and Quantities, TFC = Total Fixed Cost, TVC = Total Variable Cost.

**Statistical Analysis:** A k-mean cluster analysis was performed based on the previously obtained R/C ratio values to classify the goat farmers. A total of 3 clusters were formed for better interpretation. This process used SPSS 27 data processing software from IBM and Microsoft Excel 365 Version 2408 (Build 17928.20114).

## RESULT

Goat farmers in Majene Regency are classified into three groups, called Cluster. Cluster 1 has 10 samples of farmers, then Cluster 2 has 58 samples, and Cluster 3 has 55 samples. This grouping differentiates goat farmers in the Majene Regency based on their R/C ratio, so it is known that Cluster 1 is the highest. Cluster 2 is medium, and Cluster 3 is the lowest (Table 1).

**Table 1. Description of R/C Ratio of each Cluster**

	R/C Ratio				
	N	Min	Max	Mean	Stdev
Cluster 1	10	2,05	3,43	2,66	0,52
Cluster 2	58	0,94	1,93	1,33	0,29
Cluster 3	55	-0,53	0,90	0,51	0,27

**Table 2. Demographic profile of goat farmers in Majene Regency, West Sulawesi Province**

Variables	Type	Cluster 1 (n=10)		Cluster 2 (n=58)		Cluster 3 (n=55)	
		Freq (n)	Percent	Freq (n)	Percent	Freq (n)	Percent
Gender	Man	10	100	57	98,28	54	98,18
	Woman	0	0	1	2	1	2
Formal Education (Grade)	Didn't School	3	30	3	5,17	5	9,09
	Elementary School	2	20,00	11	18,97	19	34,55
	Middle School	2	20,00	16	27,59	7	12,73
	High School	1	10,00	23	39,66	20	36,36
	More Higher	2	20,00	5	8,62	4	7,27
Age (Years)	15-24		-	-	-	2	3,64
	25-45	7	70,00	28	48,28	27	49,09
	46-65	3	30,00	29	50,00	26	47,27
	>65		-	1	1,72	-	-
Experience (Years)	1-5	1	10,00	17	29,31	16	9,09
	6-10	4	40,00	19	32,76	19	25,45
	11-20	2	20,00	11	18,97	9	20,00
	21-40	3	30,00	10	17,24	11	45,45
	>41		-	1	1,72	-	-
Primary Job	Farmer	6	60,00	28	48,28	34	62,82
	Goat Farmer	2	20,00	13	22,41	11	20,00
	Other	2	20,00	17	29,31	10	18,18
Business Scale (Heads)	<5	1	10,00	20	34,48	20	36,36
	5-10	4	40,00	31	53,45	29	52,73
	>10	5	50,00	7	12,07	6	10,91



To see the demographic profile of goat farmers, it can be seen in Table 2.

**Gender:** Men dominate the goat breeding business in the Majene Regency. Cluster 1 does not have female farmers. But on the contrary, in Clusters 2 and 3, each has one female goat farmer.

**Formal Education:** The formal education achieved by farmers in Cluster 1 is dominated by farmers who did not go to school 30%. Clusters 2 and 3 are dominated by the high school level, with a percentage of 39.66% and 36.36%, respectively, and it is slightly different with elementary school and higher level education. The lowest level of education in Cluster 1 is the high school level. Farmers who did not go to school became the least in Cluster 2, and Cluster 3, at a higher level of education, obtained the lowest rate. In Figure 2, the data visualization supports the findings on the demographic profile of goat farmers in Majene Regency.

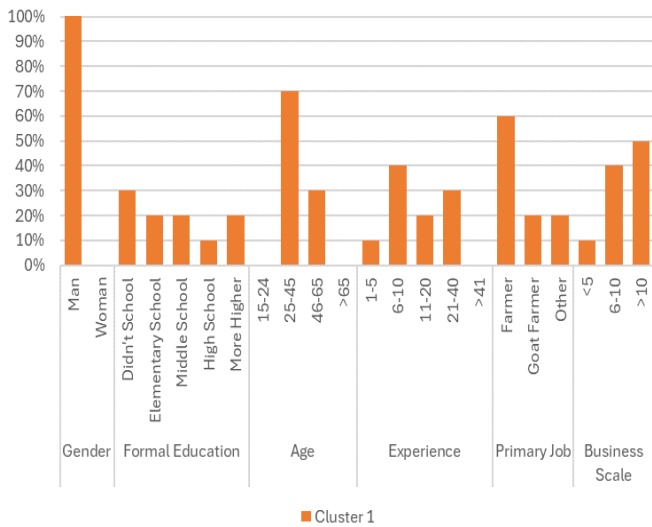


Figure 1. Demographic Profile of Cluster 1 Goat Farmers.

**Age:** Based on Table 2 and visualization from Figure 2, it is known that the 25-45 age group dominates Cluster 1 by 70%, followed by Cluster 3 (49.09%) and Cluster 2 (48.28%). Then, in the 26-65 age group, Cluster 2 and Cluster 3 are dominant, respectively. For the 15-24 age group, Cluster 3 only has 3.64%, and Cluster 2 only has an age group above >65 years of age of 1.72%.

**Experience:** Based on the data in Table 2, there is an exciting pattern related to the experience of farmers in each cluster. Clusters 1 and 2 tend to be populated by farmers with medium experience (6-10 years), while Cluster 3 is dominated by farmers with considerable experience (21-40 years). All clusters have the lowest percentage in the early experience category (1-5 years). Interestingly, Cluster 2 is the only cluster with a group of farmers with very long experience (more than 41 years) at 1.72%.

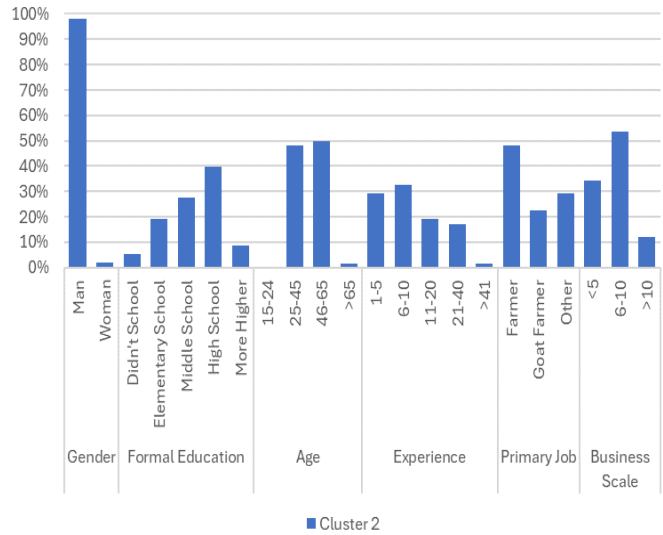


Figure 2. Demographic Profile of Cluster 2 Goat Farmers.

**Primary Job:** Based on Table 2, all clusters show results indicating that the main occupation of goat farmers in Majene Regency is a farmer with percentages of 60% (Cluster 1), 48% (Cluster 2), and 62% (Cluster 3) each, respectively. Then, occupations other than farmers and goat farmers are the minority in Clusters 1 and 3, while Cluster 2 is in second place.

**Business Scale:** Table 2 shows a linear relationship between the goat farming business scale and the R/C ratio. Cluster 1 is dominated by farmers with the largest goat holdings, with more than 50% owning more than ten goats. Clusters 2 and 3 also show a similar pattern, with most farmers owning 5-10 goats. In contrast, the percentage of farmers with less than five goats is the lowest in each cluster. However, in Clusters 2 and 3, there are about 20 farmers with less than five goats.

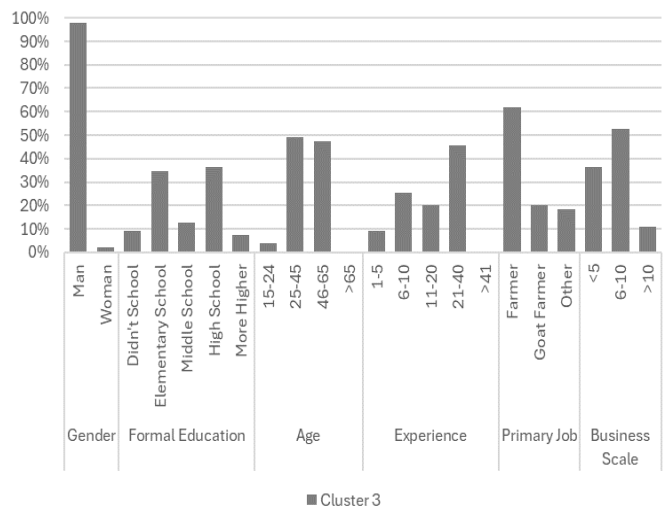


Figure 3. Demographic Profile of Cluster 3 Goat Farmers



## DISCUSSION

Men dominate the goat breeding business in Majene Regency. This contrasting difference may be because goat breeding in Majene Regency is a type of work that requires a considerable amount of energy, especially when collecting feed. Goat farmers collect feed by cutting grass in the garden (cut) and carrying it to the cage (carry) (Kinati and Mulema, 2019). This process requires considerable physical strength, so men generally do this work. However, women also play a role in this activity, although they carry less feed to reduce the burden. Some respondents stated that they are sometimes assisted by their wives in taking care of the goats, including fetching feed, cleaning cages, collecting feces, and sometimes bathing and caring for sick or pregnant goats (Zahra *et al.*, 2014; Utami *et al.*, 2017).

Cluster 1, which has the highest R/C Ratio, is dominated by farmers who do not attend formal education. This is interesting because, in general, farmers with a higher level of education are expected to have better quality of work and business management (Byaruhanga *et al.*, 2015). However, Cluster 1 which is less formally educated can achieve higher business efficiency, which contradicts the findings (Ezeibe *et al.*, 2014; Nwachukwu & Berekwu, 2020). On the other hand, Clusters 2 and 3 are dominated by farmers with high school education, who in theory, should have better abilities in managing goat livestock and implementing more effective business management (Philemon, 2017). With this educational background, they should be able to produce higher productivity and a more significant number of livestock, but the results obtained show the opposite (Ezeibe *et al.*, 2014; Palada, 2020). This phenomenon may be because Cluster 1 farmers have been practicing goat farming for generations (Prank *et al.*, 2023), so good and efficient farming practices have been adopted from previous generations. Through long generations, farming families may have conducted many natural trials, so the methods they use have been filtered and proven successful in the field, even without the intervention of modern technology. This is evident in goat breeding techniques in the Majene Regency, which mainly apply intensive and semi-intensive goat breeding systems (Suhartina, 2017). Although the results obtained by farmers who do not have formal education have high efficiency, this also does not rule out that there are farmers from Cluster 1 who have formal education, even to a higher level.

In addition, the unique thing is that Cluster 1 is dominated by farmers with an age range that is still productive and has enough experience. This indicates that age and experience must be considered to earn a high income in the goat farming business. Compared to Cluster 2 and Cluster 3, which are dominated by farmers with an age range of 46-65 years, the difference is insignificant, although Cluster 3 has a higher age range of 25-45 years. This indicates that goat farmers tend to age and reach the peak of goat ownership at this age.

According to Andarwati *et al.*, (2018) and Sugiarto & Ahmad, (2015) mentioned that age is closely related to productivity, so this condition can cause several disadvantages, one of which is a decrease in the ability to do heavy physical work in goat farming (Nurdiansyah *et al.*, 2020; Tulle *et al.*, 2021), which can ultimately have an impact on decreased productivity. Figures 2 and 3 show that the number of goat owners decreases as they age. This decrease in productivity can also result in a reduction in income (Sondakh *et al.*, 2019; Sugiarto *et al.*, 2021). In addition, goat farmers' average age is 44.24 years. This is not significantly different from the findings (Desta, 2019; Haruddin *et al.*, 2023). In addition, this fact shows that goat farmers in Majene Regency are aging, which could impact the sustainability of the goat farming business in the future.

The aspect of livestock experience is not a determinant of income increase. Based on Figure 3, Cluster 3 is dominated by farmers with expertise in the range of 21-40 years. This is undoubtedly the opposite because previous research has shown that livestock farming experience is closely related to the knowledge possessed by farmers (Hastang and Asnawi, 2014) and should be linear with the improvement of business efficiency (Handayani *et al.*, 2024). This happens because there are still many farmers who have not been involved and applied the development of science in the practice of raising goats (Djohy, 2022). The proof is that many farmers still carry out livestock breeding activities traditionally based on hereditary habits. It affects production methods, productivity, and management ability in managing livestock businesses (Maesya & Rusdiana, 2018; Behingan *et al.*, 2022).

All groups showed that the main occupation of goat farmers in Majene Regency was farming, and the enormous scale of livestock ownership was in Cluster 1. This is related to their time allocation to carry out livestock activities. Due to other activities that are top priorities, goat farming does not receive full attention. Therefore, farmers tend to keep fewer livestock to remain able to do their primary job. This fact shows that goat farming is only limited to a side activity and functions as a savings (Jegoda *et al.*, 2022), which can be sold at any time when the farmer needs money (Suhartina *et al.*, 2017). This condition certainly impacts the lack of attention to production quality (Ginting *et al.*, 2020). In addition, this also results in a low scale of livestock ownership due to the limited allocation of available working time (Sudrajat *et al.*, 2022). If this condition continues, it can be a setback for the development of goat farming. Why is that? Because it will be challenging to maximize the great potential and advantages of goat breeding. The public may judge that raising livestock is not profitable. In fact, according to Purwanti (2015), the more livestock owned, the smaller the burden of production costs incurred because a more significant number of livestock shares the cost.

We are aware that several limitations were found during the preparation of this study. Because this research was





conducted on small-scale goat farmers who use traditional systems, it is quite difficult to collect data to find R/C ratio values such as production costs and receipts, so researchers must do manual calculations based on information from goat farmers. This causes the duration of interviews and direct reviews on each sample to range from 20-40 minutes. In addition, it also takes time for post-data processing data collection. Then, because breeders are dispersed, it is rather difficult to find them especially in goat breeders who are eligible for further research.

**Conclusion:** The demographic profile of goat farmers in Majene Regency presents many facts, which are summarized in the following key findings:

1. Technical efficiency related to physical strength: Raising goats that require adequate physical strength makes male farmers more efficient.
2. Business efficiency does not depend on formal education: Farmers in Cluster 1, although poorly educated, achieve higher business efficiency compared to Clusters 2 and 3, in which farmers with high school education dominate.
3. Productive age and experience support efficiency, but not always: Productive-age farmers with enough experience can improve business efficiency, but traditional methods can hinder productivity.
4. Efficiency is not optimal due to traditional management: Long experience is not always balanced with applying modern knowledge, so business efficiency is not optimal.
5. Farmers' livelihoods affect ownership: Goat farming is a side business for farmers whose main occupation is farming, so the scale of livestock ownership is low and less productive due to the division of attention.

This finding emphasizes the need for empowerment for women farmers, such as forming a Farmer Women Group (FWG) to process post-harvest from the goat farming business and help their husbands with their work. Furthermore, counseling and training are needed for goat farmers who consider traditional methods to optimize efficiency. In addition, government policies are directed at increasing business scale and modernizing management for farmers who make raising livestock a side business. More detail, a pilot or fostered goat farm with easy, efficient and profitable management is needed based on technology so that farmers who still make raising livestock a side job are more confident and switch to focus more on goat breeding activities.

**Authors' contribution statement:** Muhammad Iqbal Rivai, who wrote this article, contributed to concept development, data collection, formal analysis, funding acquisition, project administration, and draft writing; Siti Nurlaelah contributed to conceptualization, monitoring and validation; Tanrigiling Rasyid contributed to conceptualization, methodology, validation, and writing.

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