ISSN 2088-3609

Agrinimal

Jurnal Ilmu Ternak dan Tanaman

Volume 5, Nomor 1, April 2015

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THE MULTIFUNCTION OF ARFAK TRIBE PIG FARMING SYSTEMS IN MANOKWARI, WEST PAPUA-INDONESIA

D.A. Iyai[1,*], D.T.R. Saragih[1], Mulyadi[1] and B. Gobay[2†]

[1]Department of Animal Production. Faculty of Animal Husbandry. Papua University. Manokwari. Postal code 98314. Papua Barat-Indonesia.
[2]Graduated Student of Animal Production. Fac. of Animal Husbandry. Papua University.
*Corresponding e-mail: da.iyai@yahoo.com

ABSTRACT

The multifunction of pigs for the Papuan are divergences and interelated. This study was aimed to seek the multifunction of keeping pigs done by Arfak tribe and to find the relationships of economical and socio-cultures components determining the development of pig farming in Manokwari. A one-month field research was done at Manokwari Barat district. Quiztionaire was the tool used to record and collect the data. Snowball method was applied to chose the pig farmer participants and 60 respondents were participated. Several variables were quantified to measure the percentages of socio-culture and economic objectives. The finding shown that income generation, savings barter were the subsequent components shaping the economic objectives and while organic fertilizer and biofertilizer resulted from manure were not applied yet. Although dung was frequently produced and spreaded at the pig house and around backyard. Socio-culture was done in the means of merrital prices, peaceness, gift and parties, respectively. The other findings were that the alternation of pig development indicated by herd size had positive relationship with the two motives. Similar relationship was shown by number of aided farmers. Hence, the changes of pig farming systems, e.g. extensive to semi-intensive and/or intensive to semi-intensive had shown weak relationship.

Key words: economical motive, social-culture motive, Arfak pig farmers, Manokwari

MULTIFUNGSI PETERNAKAN BABI PADA SUKU ARFAK DI MANOKWARI, PROVINSI PAPUA BARAT-INDONESIA

ABSTRAK

Multifungsi ternak babi untuk masyarakat Papua beragam dan saling berhubungan. Penelitian ini bertujuan utuk menentukan multifungsi peternakan babi pada etnis Arfak dan menemukan hubungan komponen ekonomi dan social-budaya yang menentukan pembangunan peternakan babi di Manokwari. Satu bulan penelitian lapang dilakukan pada distrik Manokwari Barat. Kuisioner digunakan sebagai alat untuk merekam dan mengumpulkan data. Metode Snowball digunakan untuk menentukan sebanyak 60 responden yang berpartisipasi. Beberapa variable yang diukur menentukan persentase dari tujuan ekonomi dan social-budaya. Hasil penelitian menunjukkan bahwa pendapatan, tabungan dan barter adalah berturut-turut variable yang menentukan tujuan ekonomi. Komponen pupuk organic dan pupuk bio yang dihasilkand ari feses belum dimanfaatkan, walaupun cukup tersedia. Fungsi social-budaya dilakukan dengan cara pembayaran harta, perdamaian, hadih dan acara syukuran. Temuan lainnya adalah perubahan pembangunan peternakan babi diindikasikan oleh ukuran populasi ternak, karena hubungan yang positif dengan kedua komponen ekonomi dan social-budaya. Hubungan yang sama ditunjukkan juga oleh peternakan yang dibantu. Perubahan peternakan babi misalnya ekstensif ke semi-intensif dan atau intensif ke semin intensif menunjukkan hubungan yang lemah.

Kata kunci: motif ekonomi, motif social budaya, peternak etnis Arfak, Manokwari.

INTRODUCTION

Pigs are highly valued and have a top priority of animal agriculture bredin Papua and West Papua. Most native Papuan tribes are crops and livestock farmers.The majority of farmers In Papua live at Sorong, Birdhead (Basna, 2010, Basna, 2011), Kebar (Randa, 1994), Manokwari (Iyai, 2008), Sattelite islands of Biak (Marjen, 2007) and Yapen (Usior, 2008), Highlanders (Peters, 2007; Katagame, 2012) and Papua Southern dependent their livelihood and other rituals and important ceremonial on the pigs.

Both conventional (Batam, crossed large white and saddle back) and the wild (*Sus scrofa*), pigs have determined the shapes and dynamic of livelihoods of many native Papuan tribes. Many studies done to expereince the contribution of pigs to livelihood income generation (Warastuti, 2001; Iyai, 2008; Awom, 2010; Gobay, 2011). In one hand texts of social values of the pigs have been explored by several authors as well (Salabai, 2009). Inclining population of pigs is due to demands of open access local markets. The majority of Christian followers in Manokwari has benefits for pig farmers.Therefore Warastuti (2001) concluded that pig agribusiness has potential economical values for local Papuan. Demand of pig cuts in Manokwari has been increasing. Level of preferency of pig meat tend to increase.

Today population of the Arfak tribes occupy several urban resettlements in Manokwari town (Iyai, 2008). Iyai (2011) mentioned several areas where Arfak people can be met are district of West Manokwari, Southern Manokwari, Southern East and/or Southern coastal areas, i.e. Oransbari & Ransiki districts, Warmare, Northern Manokwari, Prafi and Masni Districts. The Arfak tribe actually occupy highland mountain of Arfak such as Minyambouw, Anggi. Some are living at the new districts such as Catubouw, Tanah Rubuh, etc. In socio-cultural values, pigs are frequently used as cultural ritual including merrital prices, barter, peaceness such as conflict, war, murder and death and other socio clashes. Pigs also determine social status in community, examples are given in Arfak tribe (Salabai, 2009), Dani and Amungme (Katagame, 2012) and Mee tribe (Pekey, 2010) at high mountain Papua. The more the pigs farmers have the more socio-rank the farmers have in Papua. Pigs for Arfak have higher value than timor cloth (*kain timur*), toba cloth and paseda. The image and behave poped up to the pigs is how pigs are kept in a such a means like “a son of farmers” (Salabay, 2009), shich is similar meaning to Mee tribe.

Several studies of economic contribution to increasing economic income were resulted by Warastuti (2001), Awom (2010) and Gobay (2010). However detail contribution of pigs resulted from were not mentioned yet. Most authors such as Warastuti (2001), Ropa (2001), and Awom (2010) had mentioned sold live pigs, and sale cuts. Other shapes and means for obtaining cash have not mentioned yet so far. By identifying detailed components of social and economic components, impressions can be made and improved.

Not only pigs are kept in the highland communities (Randa, 1994; Katagame, 2012), pigs are also kept and bred at some satelitte islands of Papua such as Biak (Marjen, 2007), Yapen (Usior, 2008) and Lowland areas of Nabire (Idie, 2003), lowland areas of Manokwari (Iyai, 2008) coastal area of Manokwari (Warastuti, 2001). The finding of the latter has been shown that the Arfak farmers have close relationship with the pigs and that has been run so far recently. The farming pigs is therefore not only have socio-cultural values but pigs raising also have economical values. However, according to Iyai (2008) and Marani (2004), the farming systems run were not intensively managed. The orientation of raising pigs are not identified yet. Whether the Arfak farmers have already been keeping their pigs in the economical means or for them socio-cultural demands are important and priority. This thought plays a paramound role of development indicators for animal husbandry development in Papua, particularly in Manokwari.

In their length of adaptation occupying new city, i.e. Manokwari , with its dynamic, we argue that their social and economical orientation with respect to objectives will further interchangeable and unstable. We argued that these social aspects had no association with pig farming development in Manokwari, and likewise economical aspects have association. In understanding the reasons for raising pigs, this socio-ethnic study was aimed for.

MATERIALSAND METHODS

A one month socio-anthro approched, starting from 29th of November to 20th of December 2010, was done under administrative region of Manokwari Barat District, Manokwari regency. Three Sub-districts were selected where Arfak tribe pig farmers dominantly settled, i.e. Wosi, Sanggeng and Amban. We had 60 households as respondents selected based on snowball sampling methods involved in semi-structure interviewes. Triangulation of data was made by interviewing culcural board representative in Manokwari (Dewan Adat-Suku Arfak).

Parameters used were economical, socio-cultural motivation and development of pig farming systems.In operational concepts we define income as a fresh money earned as a result of selling pig products. Net income is therefore calculated as total farm generated income minus fixed cost of production. Saving is defined as sum of pig herds kept and calculated in money (pigs/hh). Barter is defined as sum of pigs used as excange tools with other things (pigs/hh). Organic fertilizer is defined as wastes produced from pigs applied to fertilize the farm land (kg/ha/hh) calculated based on sum of manure used compare to sum of manure marketed (kg/Rp/hh). Socio-cultural motives comprise of merrital prices. Peace objective is defined as sum of pigs used to compensate a clash such as tribe and/or family war, conflicts vertical with government and horizontalwith other community. Pig aid is defied assum of pigs used as gift to other closed relatives. Cultural party defines sum of pigs used to celebrate parties (pigs/hh). Motive of farmers is defined as the reasons or stimulants come out from the farmers to keep the pigs.

Table 1. Description of economical and socio-cultural indicators

Variable	Indicator	Criteria	Percentages (%)	Score	Value
Economical motives	Selling whole products for cash	Net income	40	(1-10)	
	Partly pigs kept for savings	Total herd size	30	(1-10)	
	Separately pigs used as barter	Barter	20	(1-10)	
	Pigs as a source of biofertilizer	Amount of organic fertilizer	10	(1-10)	
	Total		100		
Socio-cultural motives	Pigs used as marrital prices	Marrital prices	40	(1-10)	
	Pigs used as peace tool as conflict materials	Conflicts or cultural penalty	30	(1-10)	
	Pigs used as gift	Number of life pigs aid for relatives	20	(1-10)	
	Pigs used as parties	Number of pigs used each party	10	(1-10)	
	Total		100		

The value of motive is used as percentages (%) calculated by summing total each motivation components devided by 1000 multiplied by 100%. Mathematical formula is then M= $\frac{\sum Nm}{1000} \times 100\%$, We use 1000 as accumulative values obtained from two important components, economics and socio-cultures, which computed based on given score marks.

Indicator of pig development consists of number of pigs based on physiological ages raised by pig farmers, i.e. piglet, grower, sows, and boars (pigs/hh). Number of relatives and/or family either Arfak pepole or Papuan were included (pigs/hh). Change of pig farming systems (Iyai, 2008; Iyai *et al*. 2010; Iyai *et al*. 2011) was made by using parameter and identification made by Iyai (2008), which consisted of free-range (scavenging) pig systems, restrained pig systems, semi-penned systems and penned systems. The changes of pig farming systems were seen in Table 2.

Tabel 2. Changes of pig frming systems used in this study

Pig farming systems*	Free-ranges	Semi-Penned system	Penned system
Free-range	1	2	3
Semi-penned	-1	1	2
Penned	-2	-1	1

*Modified after Iyai (2008).

Following is the indicators used in chategorizing pig farming systems development, e.g. technology used, scale, labours involves, capital investment, and management. Table 2 tells us that every change of pig farming systems has its converted values. We used indices of -2 for changes of pig farming systems from penned to free-range pig farming system and indeed we used 3 for changes of free-range to penned systems and the values given were -10 and 15, respectively.

RESULTS AND DISCUSSIONS

Profileof pig farmers related to Subdistricts

Subdistricts where pig farmers live are ruled by administration of Western District consist of Wosi, sanggeng and Amban. The majority of Arfak community (30 hh or 50%) live in Wosi, Sanggeng (15 hh or 25%) and Amban (15 hh or 25%).Interviewed results of the reasons were due to land right of their anchestor. Besides, other important economical reasons that "being close to the available access of local markets". This is in line with the common livelihood systems as farmers (Iyai, 2008; Iyai & Randa, 2011). Market for their images has played an important role for providing free feeding inggredients for animal, which are using wastes of agricultures and its residues for feeding the pigs. Thought for being efficient in reducing variable cost is exist and appreciateable. This reason was also in line with other findings of Marani (2004) and Awom (2010). We also recommended several relevant subdistricts suitable for finding the trends and dynamic of pig farming study, i.e. Reremi puncak, Fanindi dalam, Pasir putih, Susweni and Northern part of Manokwari. These areas can be a good reference for sampling and improving pig productivity. One important note is to seek and to compare also rural objectives, either their objective is market (demanded) orieted or socio-cultural (resource) base oriented.

Characteristics of the Pig farmers

The finding of the farmer information shown that the ages in average consisted of 33.1±10.7 (y), which is stated that the range is in productive ages according to Mubyarto (1995). In the productive ages, individual will have more an ease to adopt and stand for the risks of new thingsin raising pigs compare to oldest ages. This finding was confirmed by Marani (2004), Awom (2010) dan Iyai (2008).

The majority pig keepers of Arfak tribe was dominated by man, i.e. 51 hh (85%).This finding is commonly found in Papua, where a man has responsibility to provide basic needs for families. For Arfak tribe cases, few women (9 persons =15%) were involved in keeping pigs. Cultural fact comparation amongst coastal and highland tribes is vary for some aspects. Similar finding also confirmed by Iyai (2008), Iyai *et al*. (2010). The role of women in this aspect is as the household leader and/or responsible for farming the pigs. One fact is that job description of man and women in Arfak and some other tribes in Papuan is being promoted. Although supporting data/study to find the effect of women rising and man raising pigs is not available yet.

Education tend to change recently. We found that education level of the Arfk tribe was altered from dominantly non-educated to junior and senior high school. 28,33% farmers were in SHS and 21% was in elementary. While 20% was not educated and only few farmers had graduated from university. This finding is the majority fact as also reported by Marjen (2007) and Usior (2008). Education provide ability to creatively think to improve pig farming. However, experience as well as give contribution in productivities. Experiences are not gaining in formal education however it is found at practices.

The principal finding of experience was that 26 hh (43%) had 6-10 years in raising pigs. Experience ≤5 years was 35% , and >11 years was 21%. This fact shown that in terms of period of raising pigs was exist. The more experience is gained the more local kowledge/wisdom is collected. This in line with Kasmiatum (2003), where knowldge obtained is derived from long term experience. It has been known that number of household members plays a significant role for household labours. The majoroty number of household member was in the range of 5-8 persons and followed by 1-4 persons and 11% has 9 household members. Types of family members in Papua are bounded with ther relatives, such as nepew and parents in law. Based on Sagrim (2002), a merried Arfak man should live at his parent and his relatives consisted of wife and husband and nuclues family such as 3 to 5 children. The larger number of household family the larger number of hausehold family labour is available for doing farming works.

Economical objectives

Economical objectives comprised of number of sold pigs, income generation, organic fertilizer, savings, and barter. The findings of this study were that the majority of farmers (41,67%) were sold their piglets (babi pigs), followed by farmers sold growers (29,76%) and adults (28,57%). The percentages of sold piglets were due to economical reasons and technical reasons. In economical reasons, raising piglets or weaned piglets need additional costs for milk and electricity and providing well bedding. While, not many farmers during rearing pigs seldom provide such things. In technical consideration, it needs skillfull labour. Most of the farmers do have low qualify in rasing pigs. Iyai (2008) mentioned that mortality was found during early life of pigs. Pig farmers do not have certain places for slaugthering pigs. Close relatives and neighbours are invited at certain day for offering the meat. One piece of cuts price is at least Rp. 100.000,00.

Table 3. Bio-description of Pig Farmers in Manokwari

Farmers information	Households (n=60 hh)	Percentage(%)	Mean±SD
Ages (y)			33.1±10.7
Sex			
Man	51	85	
Woman	9	15	
Education level			
Non education	12	20	
Elementary	13	21.67	
JHS	12	20	
SHS	17	28.33	
University	6	10	
Experience (y)			8.3±6.4
Family number (person/hh)			5.1±2.2

JHS=Junior high school. SHS=Senior high school.

Table4. Distribution of farmers based on economical objectives

Objective of Economic	Number offarmer (hh)	Proportion(%)	Mean±SD	Percentages (% Mean ± SD)
Sold (heads)				17.46±14.50
Piglets	35	41.67	4.2±2.1	
Grower	25	29.76	3.0±1.5	
Adults	24	28.57	1.6±0.8	
Incomes (Rp)			6.743.636±7.777.097	
Savings (hh)				7.05±6.67
Yes (hh)	30	50		
No (hh)	30	50		
Barter				4.73±6.47
Yes (hh)	10	16.66		
No (hh)	50	83.34		
Bio-fertilizer	0	0		1.00 ±0.00
Total				30.21±20.09

Table5. Distribution of Arfak farmers based on socio-cultural objectives.

Socio-cultural motive	Respodents (hh)	Proportion (%)	Mean±SD (Head)	Percentage of Objective (mean±SD)
Merrital price (head/hh/y)				
< 4	43	71,67	2.6±3.5	11.20±10.76
4-8	13	21,66		
≥ 9	4	6,67		
Peaceness (head/hh/y)				5.70±4.54
< 2	37	61,67	1.4±1.8	
2-4	16	26,66		
≥5	7	11,67		
Gift (head/hh/y)				4.53±3.66
< 3	42	70	1.8±2.1	
3-6	16	26,67		
≥7	2	3,33		
Parties (head/hh/y)				1.43±1.28
< 3	54	90	.8±1.7	
3-6	5	8,33		
≥ 7	1	1,67		
Total(head/hh/y)				22.83±16.66
<10	42	70	6.6±7.3	
10-20	14	23,33		
≥20	4	6,67		

The lower income of raising pigs was 10 million rupiahs (78.33%). In small number of farmers earned income in range of 10 millions to 20 millions rupiahs every year. And only in few number of farmers obtained cash more than that of 21 million rupiahs per year. The fluctuative of income selling pigs depends on the number of pigs that are reared and sold. Due to socio-cultural in Arfak tribes. Number of pigs reared

will not assure the income created. This will further be explained in socio-culture aspects.

The objective of savings, i.e. rearing the pigs a life in the pig house (kandang)', was done by 50 % of pig farmers.The pigs will be sold if farmers have quick basic needs, such as education, conflict and cultural needs. Saving pigs when the research done were showing the number of pig herds reared and that also shown the richness status of farmers. Pigs used as barter objective was 16.66% of respondents. The rests did not use pigs as barter. The ways how barter practised were exchange pigs with feeds of agricultural crops and its residues. The ages of pigs bartered were at piglet or weaned piglets. The prices of piglets and weaned piglets (ages of 1-3 months) were at range of 6 hundred thousand rupiahs. This barter is oftenly done by farmers who do not have lands. Therefore, the objectives of economical function were as sources of income, savings, barter and bio-fertilizer.

Socio-cultural objectives

Socio cultural objectives comprise of merrital prices, peaceness, gift and parties. Of the evaluation done in average number of pigs used was subsequently merrital prices, gift, peaceness and parties, i.e. 2.6±3.5 heads/hh/y, 1.8±2.1 head/hh/y, 1.4±1.8 head/hh/y, 0.8±1.7 head/hh/y.Similar to that of economical objectives, allocation of pig percentage counting used to compute socio-cultural objectives is determined by the number of pigs allocated to socio-cultural objectives. It was evaluated that the way wecompute should be based on the number of pigs used to each socio-cultural activity divided by the whole pigs reared by farmers. For instance, merrital prices use 4 heads of pigs and the total population pigs is 20 then the percentage of motivation to merrital prices is $\frac{4}{20}$ x100 % = 20%.

Merrital prices

Table 5. clearly depicts the majority of ethnic Arfak for allocating their pigs were > 4 heads/hh/y for 43 hh, 4 to 8 heads/hh/y for 13 hh, and < 9 heads/hh/y for 4 hh, respectively. The cultural event of merrital price payment is oftenly arranged by the women's family. The price of merrital depends on the socil statusof the parent and education levels of the bridge. Example told by the cultural board that if the women is Arfak a long with its parent status of Arfak tribe head and the wome has high level of education for instance university graduated, then the price will be paid more than that, likewise. The pigs used should be in the range of growers and adult physical ages, should healthy and the cost of pigs is more than 3 millions rupiahs.

The farmers of Arfak ethnic used pigs for peaceness if there are social conflicts such as murder, death, rubbery, and prostitution. The finding of this research tried to mention the number of pigs, i.e. < 2 heads used by 37 hh/y followed by the range of 2 to 4 heads/hh/y applied by 16 hh and > 5 heads applied by 7 hh.The individual or group of raising the conflict is handing in several pigs based on cultural decision. The handing in of the pigs should be celebrated in front of the head of tribe and the representatives of both sides.

Each year a number of pigs is donated to their close relatives. It was succeeded to record the number of pigs donated to the relatives, i.e. < 3 heads done by 42 hh, 3 to 6 heads/hh/y done by 16 hh and >7 heads were done by 2 hh. The lower pigs donated by the farmers are determined by the small size of herd population reared by farmers. Donated pigs is given to the new family couples so that they would rear pigs to fulfil their basic needs and the relatives facing problems.Pigs allocated for parties in average were < 3 heads used by 54 households, 3 to 6 heads used by 5 hh and more than ≥ 7 heads used by 1 hh.. Marks of social motives were credited to merrital goods, peace animal,and gift animal (13%) and parties (7%). The higher merrital goods in Arfak tribe is due to the worth of pigs for this ethnic.

The progress of Pig farming

We used indicator of alternation in pig farming systems chategorised based on Udo (1988) and adapted by Iyai (2008). The finding of this research was that no alternation development, i.e. extensive to extensive pig farming system was faced by 26 hh (43.33%). Alternation of intensive to extensive pig farming systems (declining rank) was faced by 13 hh (21.67%). Several pig farmers had semi-intensive (semi-penned) pig farming systems, i.e. 12 hh (20%). The rest was altered from extensive to semi-intensive, i.e. 9 hh (15%).

The finding of unchangeable development of pig farming systems particularly extensive pig farming system was due to the costs for establishing the pig houses. Fixed and variable costs were the two reasons why pig farmers in Papua are facing constraints (Iyai, 2008). That situation induces pigs are frequently scavenging around the backyard and other communal land. The alternation of intensive to extensive was due to housing damages. No cost and/or low invesment practised by local Papuan particularly the Arfak induce social conflicts where the pigs are injured by accidents. The changes of pig farming systems from extensive to semi-intenisive was due to the technical considerations. Pigs need shelter for production and reproduction. Pigs should be maintained well in an appropriate way so that production will be maintained at the optimal production. The changes of pig farming systems in Manokwari and might be in Papua has multiple implication. First of all and importantly is the farmers. The commitment and motivation, consciousness and efforts of investment are needed and

should be guided by other relevant and related parties as stakeholders and shareholders. In Manokwari the local regulation of shelter animal was issued by local goverment of Manokwari.

The test of regression analysis between animal size and economic factors (XA), animal size with socio motive (XB) and economic and socio motive towards animal size (Y1), mathematical model was resulted with the formulae of $Y_1=7.581+0.248X_A+0.451X_B$. Of mathematical model, animal size with economic motive, animal size with socio motive (XB) and economic motive and socio motive were showing positive trend towards animal size. Determination coefficient (R2) from the model contributed to almost 48.1 %. Animal size had significant relationship ($P < 0.01$) towards development of pig farming. The findings meant that the more animal are kept the more increase development of pigs are. The higher economic are growing the higher population of pigs. The second model found was the relationship between animal size with economic motive, aided farmers with socio motive (XB), mathematical model was found Y2 = -0.044+0.041xA+0.019xB.

The mathematical model above shown that aided farmers with economic motive, number of farmers with socio and economic motive had positive trend with number of aided farmers. The determinant coefficient (R^2) was 54.3%.Number of aided farmers shown significant relationship ($p<0.01$) towards pig farming development. This finding shown that, aided farmers had determinant factors for development and distributed farmers in Manokwari.The last factors tested was factor of shifted farming systems with economic motive (XA), shifted livestock farming systems with socio and economic motives and motive economic with socio motive towards pig farming development (xA), mathematical model was Y3= 5.013-0.102xA+0.072xB. It was shown that economic motive (XA) shown strong correlation ($p < 0.05$). However, shifted farming systems with socio motive (XB) had no strong relationship ($p>0.05$), economic motive with socio motive had correlation value towards shifted farming development. Determinant coefficient (R^2) from the model was 5.3 %. The shifted pig farming system had relationship with pig farming development. Economic motive had determinant factor for shifted pig farming system. Therefore, pig farming shall be directed to the market oriented and thus will be economical benefited farmers.

CONCLUSIONS

Economical motives dominated by Arfak ethnic are income generation followed by savings, barter and organic fertilizer. Social motives are dominated by merrital goods, peace, gift and parties. The changes of pig farming using animal herd size have positive correlation with economical and social motives. Similar finding also is found in number of gifted Arfak ethnic. However, the changes of pig farming systems have weak relationships.

ACKNOWLEDGEMENT

Depth thanks are handed to pig farmers in Manokwari for delivering accuracy of information and collaboration. The authors also thanked Ms. Bernadin Gobay, S.Pt. (Late) for providing valuable field data and information.

Table 6. The relationships of economical and socio-cultural objectives in determining developmentof pig farming in Manokwari

Formula	Mean±SD	r	R^2	(p)
$Y_1=-7.581+0.248X_A+0.451X_B$				
Herd size			48.1%	
Herd size vs economical objective (X_A)	11.58±17.38	0.67		0.000
Herd size vs socio-culture (X_B)	22.83±16.67	0.56		0.000
Economical objective vs socio-cultural objective	30.21±20.09	0.64		0.000
$Y_2= -0.044+0.041X_A+0.019X_B$				
Number of farmers serviced			54.3%	
Farmer serviced vs economical objective	1.08±1.33	0.62		0.000
Number of farmer serviced vs socio-cultural objective	22.83±16.67	0.70		0.000
Economicl objective vs socio-cultural objective	30.22±20.09	0.64		0.000
$Y_3= 5.013-0.102x_A+0.072X_B$				
Change of Livestock system			5.3%	
Livestock change with economic motive (xA)	0.50±4.79	-0.26		0.182
Change of Livestocksystems with socio-motive (xB)	26.33±16.32	-0.23		0.022
Economic motive with Socio Motive	19.53±12.87	0.64		0.431

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