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Farmers' Observation of Mortality and Morbidity of Some Major Livestock and Poultry In Timor-Leste

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ABSTRAK

Lebih dari 85% orang Timor mencari nafkah dari pertanian, termasuk peternakan. Dari total 204.597 rumah tangga, 86,8% memelihara ternak untuk digunakan sendiri, dan 85,5% memelihara ternak untuk dijual menurut statistik Sensus tahun 2015. Artinya, jika ternak tersebut sakit dan mati akibatnya akan berdampak pada peternak. Penyakit endemik paling umum yang membunuh ternak di Timor Leste setiap tahunnya adalah *Brucellosis* & *Septicemia epizootic* pada kerbau dan sapi Bali, *Newcastle Disease* pada unggas, *Classical Swine Fever* pada babi. Untuk kepentingan perekonomian daerah dan kesejahteraan manusia, penyakit hewan endemik ini harus dicegah dan dikendalikan. Setiap tahun pemerintah Timor-Leste menghabiskan lebih dari $100.000 untuk vaksin dan pengobatan untuk mencegah dan mengobati tiga penyakit ternak utama seperti Penyakit *Newcastle, Classical Swine Fever*, dan *Septicemia epizootica* melalui Kementerian Pertanian dan Perikanan. Investigasi penyebab utama kematian ternak dan unggas di kalangan peternak Timor Leste adalah tujuan utama studi ini. Untuk mencapai tujuan ini, survei dilakukan untuk mewawancarai peternak tentang pengamatan ternak yang hilang selama periode satu tahun. Penelitian ini menemukan bahwa 53,3% ayam kampung, 19,0% sapi Bali, 19,6% kerbau, dan 29,8% babi mati setiap tahun. Terlepas dari ketidakmampuan saya untuk mengidentifikasi penyakit tertentu yang menyebabkan kematian hewan-hewan ini, fakta bahwa tingkat vaksinasi untuk semua spesies di bawah 50% menunjukkan bahwa kemungkinan besar penyebab kematian hewan disebabkan oleh penyakit-penyakit endemic di Timor-Leste.

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ABSTRACT

Over 85% of Timorese people make a living from agriculture, including animal husbandry. From a total of 204,597 households, 86.8% kept livestock for their own use, and 85.5% kept animals for sale, according to Census statistics from 2015. This means that if these animals get sick and die as a result, it will affect livestock farmers. The most common endemic diseases that kill livestock in Timor Leste each year include Brucellosis & Septicemia Epizootic in both buffalo and Bali cattle, Newcastle Disease in poultry, Classical Swine Fever in pigs. For the benefit of regional economy and human welfare, these endemic animal diseases must be prevented and controlled. Every year the government of Timor-Leste spends over $100,000 on vaccines and medications to prevent and treat three major livestock diseases such as Newcastle Disease, Classical Swine Fever, and Septicaemia Epizootica through the Ministry of Agriculture and Fisheries. The investigation of the causes of major livestock and poultry losses among Timor Leste farmers was this study's main goal. To achieve this goal, a survey was conducted to interview farmers of their observation of livestock lost over the period of one year. This study found that 53.3% for village hens, 19.0% for Bali cattle, 19.6% for buffalo, and 29.8% for pigs died every year. Despite my inability to identify the particular diseases that caused these animal's deaths, the fact that vaccination rates for all species are below 50% suggests that these endemic illnesses were most likely to be blamed.

INTRODUCTION

The agricultural sector in general, and more specifically the livestock sector have an important role in Timorese Society. This is due to the fact that most households keep livestock. According to the 2010 & 2015 census, over 85% of all households in Timor Leste keep livestock (GDS *et al*., 2018; NSD & UNFPA, 2011). Comparison between total households and private households involve in livestock rearing is shown in the following Figure.

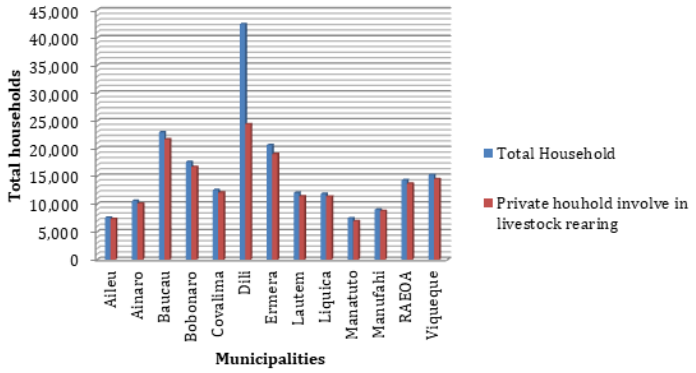

Figure 1. Total households who involved in livestock raring (census 2015)

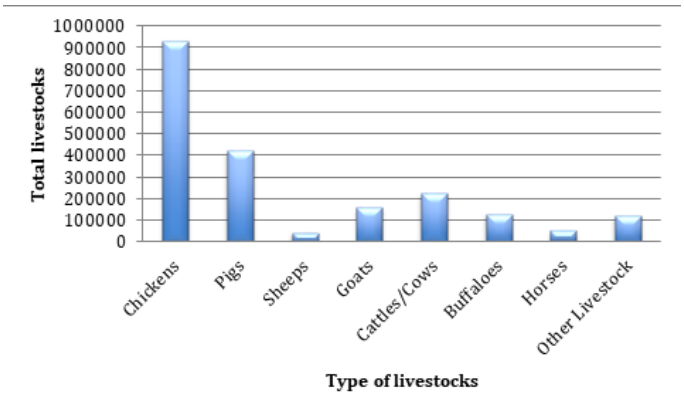

Figure 2. Major livestock raised by farmers (Census 2015)

Major livestock raised by Timorese farmers include native chickens, pigs, cattle, goats, buffaloes, and sheep (see Figure 2). In total it can be seen from the Figure that the most livestock kept by farmers include chickens (928,806), followed by pigs (419,169), cattle (221,767), goats (158,467), buffaloes (128,262), and sheep (40,498).

Based on municipalities, chickens are kept mostly in Baucau with the total of 113,548 heads, followed by Dili (99,709 heads) and Viqueque (96,652). Pigs are the second most common livestock kept by farmers. Most pigs are found in Bobonaro (49,161), followed by Dili (43,993), Baucau (42,313), Viqueque (40,792) and the rest of municipalities have pigs ranged from 14,555 in Aileu to 39,604 in Covalima (see the following Figure).

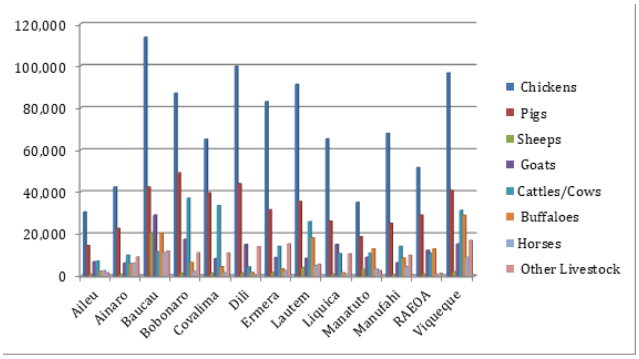

Figure 3. Livestock population according to Census 2015

If livestock diseases attack these animals, it affects livestock farmers because they depend on these animals for their livelihood. The most common endemic diseases in Timor Leste include Newcastle Disease (ND) in poultry, Classical Swine Fever (CSF) in pigs, and Septicemia Epizootic (SE) and Brucellosis in buffalo and Bali cattle (Amaral, 2016). Controlling and preventing these endemic animal diseases plays an important role in the household economy of small farmers in the country. The Timorese government, via Ministry of Agriculture and Fisheries (MAF), conduct regular vaccinations every year against the three major livestock diseases (ND, CSF and SE). However, little research has been conducted to investigate the loss of livestock due to morbidity and mortality in Timor Leste. Therefore, the goal of this study was to ascertain what led to the loss of significant livestock and poultry raised by farmers in Timor Leste.

METHODS

Site Selection

Multistage random method was used to select the survey sites. The following procedure was used to choose the survey sites: one out of thirteen municipalities from each area was randomly chosen, and then one administration post (formerly known as a sub district) was chosen for each of the

municipality. Three villages were chosen at random from among the administration posts to represent each administration post as shown in Figure 4.

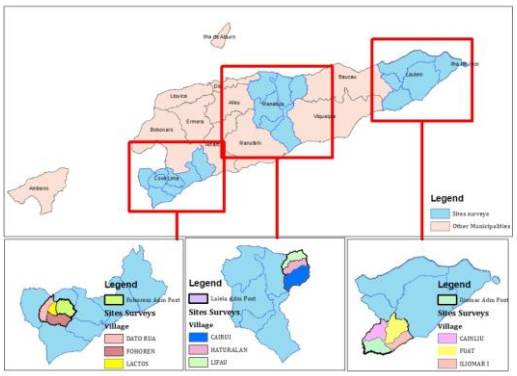

Figure 4. A map showing site surveys

The survey was conducted in 2015 and farmers were asked to report the number of livestock and poultry kept, number of death and sick animals in previous year (2014). At least 10% of the homes in the chosen villages were surveyed. To qualify for an interview, a household has to raise at least one of the following hens, ducks, pigs, Bali cattle, or buffalo. Structured questionnaires were used for the interview, which aimed to learn how many animals were kept, how many of them were sick or died in the previous year (2014). Table 1 lists the nine communities that were ultimately chosen from the three areas. There were 247 households in total participated in the study. The survey was conducted from April to May of 2015.

Statistical Method

Animal deaths reported by farmers were divided by the total number of animals owned by the households surveyed in the same year to determine the mortality rate. Similarly, the morbidity rate was determined by dividing the total number of sick animals reported by farmers by the number of animals kept by the households surveyed in the same year. The 95% confidence interval was calculated using Binomial exact method (Thulin, 2014).

RESULT AND DISCUSIONS

Over the course of the three regions, 247 households were interviewed. The following table displays information about the sites and the sample size (the total households interviewed).

Table 1. Total Households Interviewed in the Selected Villages

Muncipality	Administration post	Village	Total household interviewed
Covalima	Fohorem	Data Rua	22
		Fohorem	26
		Lactos	14
		Total	62
Lautem	Lautem	Cainliu	28

Muncipality	Administration post	Village	Total household interviewed
		Fuat	10
		Iliomar I	33
		Total	71
Manatuto	Manatuto	Hatu-ralam	30
		Kai-rui	42
		Lifau	42
		Total	114
Grand Total			247

From the interview of the 247 households, farmers reported that the morbidity rates for chickens [53.9% (52.3-55.6)], ducks [4.8% (0.1-23.8)], Bali cattle [(22.1% (20.4-23.8)], buffaloes [21.6% (19.3-24.1)], and pigs [35.3% (33.1-37.6)] (see Table 2).

Table 2. Morbidity Rate of Livestock and Poultry Reported by Farmers in Timor-Leste In 2014

Species	Total in 2014	Total sick	%Sick	95%CI*
Chicken	3739	2017	53.9	52.9-55.6
Ducks	21	1	4.8	0.1-23.8
Bali cattle	2383	526	22.10	20.4-23.8
Buffaloes	1152	249	21.60	19.3-24.1
Pigs	1788	632	35.30	33.1-37.6
Total	9083	3425		

*95%CI:95% confidence interval

Similarly, the mortality rates for chickens [53.5% (51.9-55.1)], ducks [4.8% (0.1-23.8)], Bali cattle [19.20% (17.7-20.9)], buffaloes [19.6% (17.4-22.0)], and pigs 29.0% (27.6-31.9) see (Table 3).

Table 3. Mortality Rate of Livestock and Poultry Reported by Farmers in Timor-Leste in 2014

Species	Total in 2014	Total died	%died	95%CI*
Chicken	3739	2000	53.50	51.9-55.1
Ducks	21	1	4.80	0.1-23.8
Bali cattle	2383	458	19.20	17.7-20.9
Buffaloes	1152	226	19.60	17.4-22.0
Pigs	1788	531	29.70	27.6-31.9
Total	9083	3216		

*95%CI:95% confidence interval

Farmers stated that the majority of sick animals perished. Table 4 shows how the case fatality rate for this investigation differs between species. The majority (84–100%) of the diseased animals perished.

Table 4. Case Fatality Rate (CFR) of Livestock in 2014

Species	Total in 2014	Total sick	died	CFR (%)*	95%CI*
Chicken	3739	2017	2000	99.2	51.9-55.1
Ducks	21	1	1	100.0	0.1-23.8
Bali cattle	2383	526	458	87.1	17.7-20.9
Buffaloes	1152	249	226	90.8	17.4-22.0
Pigs	1788	632	531	84.0	27.6-31.9
Total	9083	3425	3216	93.9	93.0-94.7

*CFR: Case Fatality Rate. **95% CI: 95% confidence interval

Mortality Rate of Poultry

Chickens and ducks in the village died at the rates of 53.5% (51.9-55.1%) and 4.8% (0.1-23.8%), respectively. The reason of death, however, was not revealed by the current study. There are a variety of potential causes for poultry mortality, including illnesses, predators, and harsh weather (see Table 5) (Amaral, 2011). Amaral (2011) found in a previous study that predation was a significant contributor (>70%) in the loss of both native chickens and ducks. Given the poultry (chickens and ducks) are raised extensively, this is not surprising. According to Amaral (2011) disease was the second most significant reason, accounting for 48.2% and 31.6% of all losses from native chickens and ducks, respectively.

Table 5. Factors Contribute to Native Chickens Lost (Amaral 2011)

Cause of death	HH (%)	Total Lost	Mean	Se of Mean	Range
Disease	523 (48.2)	1289	2.46	0.069	1 to 11
Predation	839 (77.4)	2258	2.69	0.060	1 to 17
Bad Weather	130 (12.0)	251	1.93	0.081	1 to 6
Others Causes	78 (7.2)	136	1.74	0.084	1 to 4
Total	1084	3934	3.61	0.08	0 to 22

The mortality could be due to Newcastle disease because the outbreak of this disease is reported every year in native chicken in Timor-Leste (da Costa Joao *et al.*, 2022). Mortality rate reported in this study is actually lower than what is observed in other nations if we assume that Newcastle Disease (ND) was the cause of the death of poultry (native chickens and ducks). For instance, Iran had ND outbreaks in commercial broilers in 2017, which resulted in severe neurological and gastrointestinal symptoms with 70–80% mortality (Ghalyanchilangeroudi *et al.*, 2018) and in Ethiopia mortality and morbidity of chicken were 90.48% and 42% respectively, were ascribed to ND (Hailegebreal *et al.*, 2022), but in layer flocks impacted by NDV, mortality rates ranged from 1.45 to 4.83%, with an average mortality of 2.89% (Balachandran *et al.*, 2014). Although the causes of the death in this study are not specified, Newcastle Disease Virus infection is

most likely to be blamed. This is because ND is extremely common in Timor Leste (Amaral & Viana, 2018) and the vaccination coverage for native chickens is low (17.6%) (Amaral, 2016). In previous study it was reported that the prevalence of Newcastle Disease in Timor-Leste ranges from 3 to 7% (Serrão *et al*., 2012). Bad weather such as flooding, extreme temperature is another factor that causes poultry losses (12% and 15.2% for native chickens and ducks, respectively). It is reported that some factors such as climate stress can weaken poultry immunity, increasing the likelihood of disease (Inbaraj *et al*., 2016).

Mortality Rate of Cattle and Buffalo

According to this survey, the death rates for Bali cattle and buffalo were 19.2% and 19.6%, respectively. Similar to this, the rates of morbidity discovered in Bali cattle and buffalo were 22.1% and 19.2%, respectively. This mortality rate has impact on Timorese economy because cattle and buffaloes are kept by many farmers. According to Census 2015, there were 29.6% (52,864/178,363) of total household that involved livestock raring kept cattle as their livestock and 14.8% (26,324/178,363) of farmers who raised livestock, keep buffaloes, see Figure 5 (GDS *et al*., 2018).

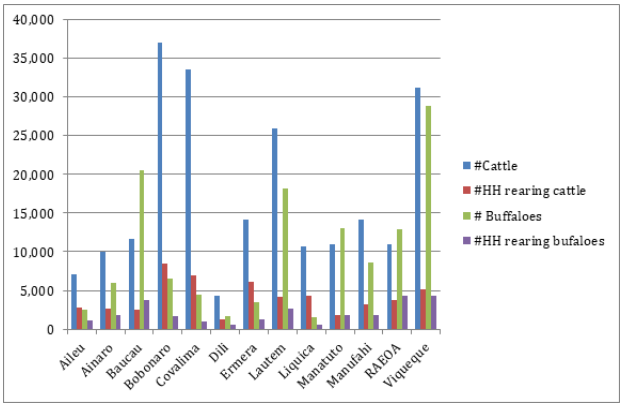

Figure 5. Number of Bali cattle and buffaloes and number of households rearing them

Despite the high mortality rates for both Bali cattle and buffaloes, the precise cause of death for either species has not been determined. However, the fatality was likely caused by endemic illness like Brucellosis, Hemorrhagic Septicemia, or Septicemia Epizootic (SE) (Amaral, 2016), and internal and external parasites. Lack of food, particularly during the dry season (July to October), and insufficient vaccination coverage for prevalent cattle diseases are other causes that could result in the death of cattle and buffalo. According to a study conducted previously, it was reported that Timor Leste has a vaccination coverage rate of 30.3% for Bali cattle and 47.1% for buffalo (Amaral, 2016).

Comparing the cattle death rates reported globally for other countries (see Table 6), the cow mortality rate in this study is greater. For instance, the Pune division of Maharashtra, India, had a mortality rate of

4.42% for cattle (Bangar *et al*., 2013). The mortality rate for calves ranges from 2.9% to 49.5% depending on the location (see Table 6). This is crucial given the enormous economic value of Bali cattle and buffalo. For example, if a farmer lost a 250 kg cattle each year at the current price of $2.50 to $2.75/Kg live weight, he or she would have lost $625 to $688 annually. Every household, according to the 2010 Census, has an average of 2 to 7 cattle. This figure is comparable to the 9.7 cattle per household average of Bali cattle held by farmers as reported by Amaral (2016). If 19.2% of these cattle died, at least one to two cattle per home per year would have perished. According to census 2010, there are 43,028 household who keep Bali cattle, and if one household lost only one 250 kg cow per year, the overall loss would be between $625 to $687.5 x 43028 = $26,892,500 to $29,581,750. This represents a significant overall cost to the economy.

Table 6. Calves Mortality Rate from Various Authors

Description	Mortality (%)	Farm Conditions	References
Calf of Bali cattle	9	Intensive system	(Baco *et al*., 2019)
	49.5	Field condition in community herd	(Baco *et al*., 2019)
Pre weaning Bali cattle mortality rate	6.2±0.6 to 6.1±0.2	Low land	(Pribadi *et al*., 2015)
	2.9±0.1 to 6.1±0.2	High land	(Pribadi *et al*., 2015)
Bali cattle calves	35% (6.12-65.5)	Not described	(Mulik, 2008) in Krova *et al*., (2020)
Pre-weaning mortality rate	6.25	Intensive rearing system	(Budisatria *et al*., 2021)
	9.68	Semi-intensive rearing system	

Mortality Rate of Pigs

In many parts of Timor-Leste, small-scale pig farmers continue to face significant challenges due to high morbidity and mortality rates. According to this study, the pig morbidity and mortality rates were 35.3% and 29.7%, respectively. The cause of this mortality rate is not identified in this study, however, most likely due to known endemic disease, Classical Swine Fever (CSF), parasitic diseases or other bacterial diseases. If it is caused by classical swine fever, this mortality rate is lower, because CSF has a high rate of morbidity and mortality, which can reach 100% (Zhou, 2019). Due to the fact that most pigs are raised improperly, there is a significant death rate among them. Pig mortality can also be caused by a number of serious illnesses, including classical swine fever and numerous parasite and bacterial diseases, as well as general nutritional problems associated with husbandry methods. Pigs only receive 28.4% of recommended vaccinations, which may contribute to the animal loss (Amaral, 2016).

As shown in Figure 6, the majority of homes in Timor-Leste keep pigs, hence the loss of pigs to these homes is highly serious.

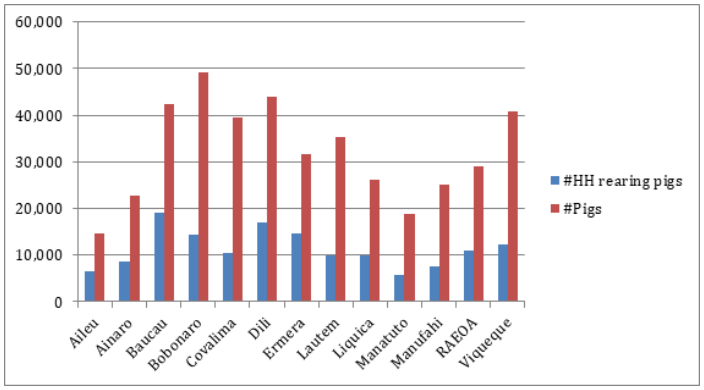

Figure 6. Number of pigs and total household rearing pigs according to Census 2015

In Timor-Leste, pigs are owned by almost every household in small numbers, hence the overall number of pigs lost may not be as great as in developed nations. For instance, the 2010 census found that every home in the nation has an average of 2 to 4 pigs, and every town has a sizable pig population of 400 to more than 1000 (NSD & UNFPA, 2011). In Timor-Leste, the death of these pigs is likely to have an impact on almost every household, unlike in large commercial enterprises in wealthy countries where the death of pigs may only effect a few people who owned corporations. It is estimated that the national pig herd in Timor-Leste is worth about USD 160 million or more than $1000 for every household that raises pigs (Smith *et al*., 2019). The death of pigs meaning the loss of millions of dollars from small scale pig farmers. Hence controlling and preventing pigs from dying is very important for farmers in Timor-Leste.

CONCLUSIONS

From this study it can be concluded that the morbidity and mortality rate in livestock varies depending on the species. Native chickens, Bali cattle, buffalo, and pigs have morbidity rates of 53.9%, 22.1%, 21.6%, and 35.3%, respectively. Native chickens, Bali cattle, buffalo, and pigs all have mortality rates of 53.5%, 19.2%, and 29.7%, respectively.

The major livestock in this study experienced a significant mortality rate, but the reason for the high mortality rates was not identified. I contend that predators, endemic diseases, and a shortage of food during the dry season are to blame for the majority of the losses.

RECOMMENDATIONS

There are two recommendations that we would like to recommend, these are: (1) Since the causes of the animal fatalities in this study were not identified, additional research is required to determine the exact causes of the deaths, and (2) To further prevent and control animal diseases, the Ministry of Agriculture and Fisheries (MAF), through its Directorate of Veterinary Services, requires more funding and research support.

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CONTRIBUTION STATEMENT

In this article, Acacio Cardoso Amaral acts as the main contributor and correspondence contributor, while Graciano Gomes acts as a member contributor.

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