# AI-COM ANIMAL CONTROL SURVEY REPORT: EFFECTIVE WAYS TO CONTROL ANIMALS DURING THE DRY SEASON, NATARBORA ADMINISTRATIVE POST, MANATUTO, TIMOR-LESTE

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# ACRONYM

| | |
|---|---|
| ACIAR | Australian Centre for International Agricultural Research |
| AI-Com | Agricultural Innovations for Community (Inovasaun Agrikultura ba Komunidade) |
| ETA-N | Eskola Téknika Agrikultura – Natarbora |
| FGD | Focus Group Discussion |
| MAP | Ministériu Agrikultura no Peska |
| UNTL | Universidade Nasional Timor Lorosa'e |
| UWA | University of Western Australia |

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*Cover picture, animals that are roamed freely during the day, taken in Sicone Diloli village.*

# I. Introduction

Planting mung bean after rice is one of AI-Com's proposed environmentally sustainable innovations to increase farm production and income. Based on empirical research in the field in 2017, AI-Com and MAF (the Ministry of Agriculture and Fisheries) researchers found that planting mung bean after rice during the dry season– instead of leaving the rice field unused–helps to improve soil fertility and increase rice production in the following season. In addition, planting mung bean does not require much time and treatment, making this innovation easy for farmers to adopt.

Building on this positive result, AI-Com together with teachers from the Natarbora Technical High School in Natarbora Administrative Post, Manatuto Municipality, trialled mung bean after rice in six farmers' rice fields in Aubeon village in 2018 and 2019. First year trials yielded approximately 1t/ha of mung bean, which is identical to the average mung bean production in Timor-Leste (1t/ha). Furthermore, participating farmers observed that rice grew better (i.e. taller stalks and thicker grains) in the areas where mung bean was planted during the preceding dry season. This increase in rice production can contribute to addressing food security and increasing farm income.

Along the south coast, there are two wet seasons in a year, which are commonly considered as first and second cropping seasons. According to the Agricultural Calendar produced by Seeds of Life and MAF, the first planting season is from December through March, and the second planting season is between June-August. Planting mung bean after rice is in the dry season, which is from September to November, when the rice field is left fallow. (Seeds of Life Agriculture Calendar for East Timor, 2010, p.26).

Livestock is an important source of income for the livelihoods of Natarbora residents. However, animal control was identified by participating farmers as one of the challenges they faced cultivating crops during the dry season in Aubeon. As reported in the 2015 Timor-Leste Census for Natabora among the three surveyed villages, Aubeon ranked the highest in terms of the number of cows (887) and buffaloes (133) compared to Uma Boco (cows: 826 and buffaloes: 99) and Fatuwake/Abat Oan (cows: 704, buffaloes: 51). Sicone Diloli is a new administrative village established in March 2017 and was therefore not included in the census. These large livestock herds present challenges for dry season cropping farmers, particularly from crop destruction by free grazing stock. Therefore, from December 16-20, 2019, AI-Com SOSEK team conducted a survey on effective ways to control animals during the dry season in Aubeon, Sicone Diloli and Uma Boco villages to assess farmers' current animal control practices and their perceptions of effective animal control methods. Specifically, this preliminary survey targeted farmers who trialled mung beans (i.e. those who understood the value of dry season animal control management), livestock owners and dry season farmers with no livestock (N= 20) to gain insight into the range of existing animal control practices used and farmer perceptions of

effective animal control management. The survey focused on livestock that typically destroy farmers' crops during the dry season, notably cows, buffaloes, horses, goats and pigs.

# II. Objectives

1. To identify current animal control practices applied in the three targeted villages.
2. To understand effective ways to control animals during the dry season in the three target villages.

# III. Methodology

## 3.1 Target communities

The main target community for this survey was Aubeon village since AI-Com conducted trials to plant mung bean after rice with farmers in this village for two consecutive dry seasons in 2018 and 2019. Since the villages of Sicone Diloli and Uma Bocu are adjacent to Aubeon and livestock generally roam across administrative land boundaries, these two villages were included in the survey to gather more information on existing animal control practices; animal zoning; problems associated with free grazing livestock; and *tara bandu* as a means of animal control regulation in each village.

## 3.2 Research methods and sampling

The main research methods used in this survey were structured and semi-structured interviews with key-informants. A total of 20 respondents were recruited, which included livestock owners who were also dry season farmers, livestock owners who were not dry season farmers, dry season farmers with no livestock, local political leaders, and ritual leaders in Aubeon, Sicone Diloli and Uma Bocu villages.

Table 1 shows the total number and categories of farmer respondents recruited into the survey. The hypothesis was that livestock owners who are dry season farmers and dry season farmers with no livestock will have a greater incentive to implement effective animal control in terms of gaining increased production and income as compared to livestock owners who are not dry season farmers.

**Table 1 Total numbers of respondents from the three villages, based on farmer characteristics.**

| Total respondents | Aubeon | Sicone Diloli | Uma Bocu | Total |
|---|---|---|---|---|
| Livestock owner (Dry season farmer) | 7 | 3 | 0 | 10 |
| Livestock owner (Non-dry season farmer) | 3 | 2 | 1 | 6 |
| Dry season farmer (No livestock) | 1 | 2 | 1 | 4 |
| **Total** | **11** | **7** | **2** | **20** |

As shown in Table 1 above, of the total of 20 respondents interviewed, half of them were livestock owners (dry season farmers), six were livestock owners (non-dry season farmers), and four respondents were dry season farmers who did not own livestock. Dry season farmers refer to respondents who grow mung bean after rice (N=3), those who grow horticulture crops (N=8), or those growing both mung bean and horticulture crops (N=3).

# IV. Results

## 4.1 Sources of income during the dry and wet seasons

The survey showed that 50% of respondents both raise livestock and are also dry season farmers, 30% are livestock owners who don't cultivate crops in the dry season farmers, and only 20% are dry season farmers without livestock. Almost all respondents who raised livestock while being dry season farmers or not (50% and 30% respectively, 80% in total) had cows, indicating that cows are important for respondents' livelihoods. Respondents can further be differentiated into those who only raised cows (38%), 31% who raised cows and pigs, 19% who raised cows and buffaloes, 6% who raised cows and goats, and lastly, 6% who only raised pigs. Reasons cited for raising livestock were for respondents to sell and be able to earn cash income to send their children to school (40%), contribute to cultural ceremonies (23%), meet daily needs (21%), prepare for emergencies (13%) and rebuild housing (3%).

### 4.1.1 Sources of income in the dry season

The main sources of income during the dry season for respondents were selling livestock (43%), horticulture crops (27%), banana (6%) and other activities as listed in Table 2 below. Furthermore, Table 2 shows that livestock owners (who are dry season farmers) depended both on selling livestock (44%) and selling horticulture crops (31%). Livestock owners (non-dry season farmers) depended mostly on selling livestock (60%) and petty business (20%). On the other hand, dry season farmers (no livestock) depended on selling horticulture crops (60%) and bananas (20%) and engaging in labour work (20%).

**Table 2 List of income sources in percentages during the dry season.**

| Source of income during dry season | Livestock Owner (dry season farmer) (%) | Livestock Owner (non-dry season farmer) (%) | Dry Season Farmer (no livestock) (%) | Total (%) |
|---|---|---|---|---|
| Livestock | 44 | 60 | 0 | 43 |
| Horticulture crops | 31 | 0 | 60 | 27 |
| Banana | 0 | 10 | 20 | 6 |
| Other income sources* | 13 | 0 | 0 | 6 |
| Labour work | 6 | 0 | 20 | 6 |
| Petty business | 0 | 20 | 0 | 6 |
| Areca nut | 0 | 10 | 0 | 3 |
| Maize | 6 | 0 | 0 | 3 |

**Note: Other income sources refers to social cash transfers received from the Timor-Leste government (for instance, the veteran pension and bolsa da mãe or cash provided for single parents or those who have many kids with low income) and casual work.*

### 4.1.2 Sources of income in the wet season

Comparatively, the main sources of income during the wet season was selling maize (25%), livestock (21%), horticulture crops (18%) and others as listed in Table 3 below. Horticulture crops planted during the rainy season were eggplant and tomato. Livestock owners (dry season farmers) depended on selling maize (37%) and horticulture crops (21%). As for the dry season, livestock owners (non-dry season farmers) depended mostly on selling livestock (56%), while dry season farmers without livestock continued to depend on selling horticulture crops (40%), followed by selling maize (20%) and selling banana (20%) during the wet season.

**Table 3 List of income sources in percentages during the wet season.**

| Source of income during wet season | Livestock Owner (dry season farmer) (%) | Livestock Owner (non-dry season farmer) (%) | Dry Season Farmer (no livestock) (%) | Total (%) |
|---|---|---|---|---|
| Maize | 37 | 11 | 20 | 25 |
| Livestock | 7 | 56 | 0 | 21 |
| Horticulture crops | 21 | 0 | 40 | 18 |
| Banana | 7 | 11 | 20 | 11 |
| Other income sources* | 14 | 0 | 0 | 7 |
| Petty business | 0 | 22 | 0 | 7 |
| Rice | 14 | 0 | 0 | 7 |
| Fishing | 0 | 0 | 20 | 4 |

**Note: Other income sources refers to social cash transfers received from the Timor-Leste government (for instance, the veteran pension and bolsa da mãe or cash provided for single parents or those who have many kids with low income) and casual work.*

## 4.2 Currently applied animal control practices and dry season farmers' practices to avoid animal destruction

Questions on animal control practice were only asked to respondents who raise livestock (80%). And, for dry season farmers who raise or did not raise livestock, a question on how they kept their crops from animal damage was asked separately.

In general, there are six types of animal control practices applied by farmers, namely: fencing, tethering, zoning, free grazing, fencing/tethering at night and free grazing during the day, and lastly, fencing off farmland (see Appendix 1:Figures 2 to 4 which illustrate animal control methods in the target villages). Each target village has a dedicated animal zone to enclose free grazing livestock. Generally, the animal zones are situated far from farmland and protected areas, such as mangroves and sacred springs. In Aubeon, the animal zone is located in an area called Kakeu Kmeek and all villagers can use it. Sicone Diloli has two animal zones situated up in the mountainous terrains of We-mak Badak used by residents in We Onu hamlet and We-kun Oan used by residents in We Kanria hamlet. Lastly, Uma Bocu has several animal zones; each zone is allocated to customary kin groups (i.e. same origin 'house' or '*uma lisan*').

Table 4 below summarises the common animal control practices applied by respondents who raise livestock. The most common animal control practice is tethering (44%), followed

by fencing livestock (33%), fencing or tethering during the night and roaming freely during daytime (11%), free grazing (7%) and 4% use animal zones.

Over half of livestock owners (who are dry season farmers) apply tethering (56%) compared to livestock owners (non-dry season farmers) who prefer fencing livestock (36%). On the other hand, the percentages of livestock owners who are not dry season farmers applied fencing or tethering during night and roaming freely during day time, roaming freely and using animal zones are higher compared to livestock owner who are dry season farmers (18% and 6%, 9% and 6% and 9% and 0% respectively).

**Table 4 Animal control practices in percentages applied across the surveyed villages.**

| Animal control practice applied | Livestock Owner (dry season farmer) (%) | Livestock Owner (non-dry season farmer) (%) | Total (%) |
|---|---|---|---|
| Tether livestock | 56 | 27 | 44 |
| Fence livestock | 31 | 36 | 33 |
| Roam freely during daytime and tether or fence at night | 6 | 18 | 11 |
| Roam freely | 6 | 9 | 7 |
| Use designated animal zones | 0 | 9 | 4 |

Interviews with local leaders highlighted that animal zones are officially promoted for animal management (see Appendix 2 for village regulations on animal control), and all the three villages have decided to enforce raising livestock in a designated zone through socialization of village regulations – formalized with *tara bandu* ceremonies held in 2017. However, at present, the designated zone is deemed inappropriate by livestock owners due to the lack of water; being too far away which allows animals to escape and become wild or lost; and livestock owners do not have the time/labour to go back and forth every day to look after their animals as they are busy with other livelihood activities. For example, livestock owners also undertake paid labour; cultivate rice, maize, and/or horticulture crops or legumes during the dry season. Some livestock owners therefore have resorted to raising their livestock on their own farmland by fencing off the land or tethering their animals, which allows them to work on their farms and keep a close watch on their animals (Interview with local leaders, December 18-19, 2019, in Aubeon and Sicone Diloli).

Almost all local leaders raised similar points related to low community awareness of the impacts of livestock on health and the environment, contending that currently applied animal control practices depend on how important community members perceive their health, environment and social life to be in relation to raising livestock. Some community members have become victims of others' inconsiderate actions. For instance, they burn off weeds arbitrarily; causing the fire to burn the fences built by livestock owners and dry season farmers.

Additionally, over half the respondents stated that their reasons for currently applied animal control practices are to avoid damage from livestock (59%). Other reasons cited based on animal control practice applied is listed in Table 5 below:

**Table 5 Reasons for choosing animal control practice applied.**

| Animal control practices applied | Reasons for chosen animal control practice applied |
|---|---|
| Tether | *"Easy to catch when we want to sell"*<br>*"Easy to control"*<br>*"Have less than 5"*<br>*"To keep livestock tame"* |
| Fence livestock | *"Do not like to see animals' manure in living area"*<br>*"No diseases spread"*<br>*"No need to build fence on farming area"* |
| Roam freely during daytime and fence or tether at night | *"To keep livestock tame"* |
| Roam freely | *"Too hot and animals need to find water to dip into"*<br>*"To find food and water by themselves"* |
| Use designated animal zone area | *"Have more time to do other work"* |

The reasons cited for allowing livestock to roam freely during daytime included the fact that there were people around to watch over their crops or properties and therefore owners can concentrate on working in their fields or labour work instead of looking after livestock. On the contrary, at night, the livestock needed to be fenced or tethered to avoid destroying other people's crops and properties since most people are indoors in their residence and there is no one to watch the livestock.

## 4.3 Effective ways to control animals during the dry season

A question on how to control animals during the dry season was asked to all respondents, including dry season farmers who are not livestock owners, to gauge their opinions on how to control animals during the dry season in order to encourage farmers to grow more crops.

When respondents were asked how to control livestock effectively for farmers to grow crops during the dry season, they stated tethering (33%), fencing farm area (29%), fencing livestock (27%) and others as listed in the Table 6 below.

Table 6 Effective ways to control livestock during dry season in percentages to encourage farmers to grow crops.

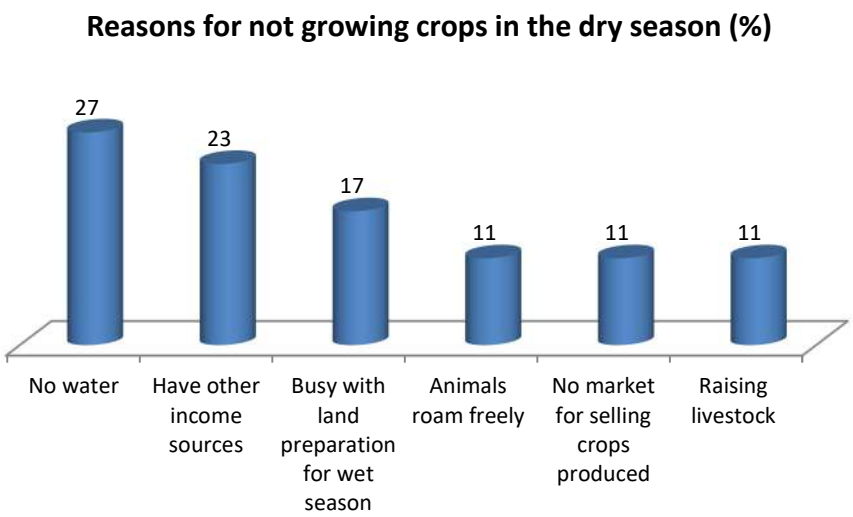
| Animal control practice applied | Livestock Owner (dry season farmer) (%) | Livestock Owner (non-dry season farmer) (%) | Dry Season Farmer (no livestock) (%) | Total (%) |
|---|---|---|---|---|
| Tether | 35 | 27 | 33 | 33 |
| Fence farming area | 38 | 0 | 33 | 29 |
| Fence livestock | 19 | 36 | 33 | 27 |
| Roam freely at daytime and tether or fence at night | 4 | 18 | 0 | 6 |
| Roam freely | 4 | 9 | 0 | 4 |
| Use animal zone | 0 | 9 | 0 | 2 |

To avoid livestock damage, all dry season farmers who raised or did not raise livestock fenced their farming area (33%).

## 4.4 Challenges farmers faced during the dry season

Free grazing animal is not the only challenge faced by farmers, deterring them from growing crops during the dry season. Based on respondents' observations and experiences, the reasons for not growing crops during dry season were having insufficient water (27%), other income sources (23%), and busy preparing land for cultivation in the wet season (17%) and others as listed in Figure 1 below:

Figure 1 Reasons for not growing crops in the dry season.




Supporting the responses above, the head of village of Sicone Diloli stated that approximately 75% of farmers cannot grow crops during dry season because of scarce water supply and no resources to pump water from the spring or river nearby or to install electric water pump in their farming area.

Land preparation typically involves burning crop residues and weeds on farmland and ploughing to prepare for cultivation in the rainy season. Due to farmers having no time, labour or resources, or because they have other additional incomes, some only focus on rainy season crops (18%) or raising animals (11%).

There are also 11% of respondents who recognized that farmers do not grow crops during rainy season due to free grazing animals that could destroy their crops.

### 4.5 Reasons to grow crops during the dry season in the future

Eighty-five percent of respondents said they wanted to grow dry season crops if there are no longer free grazing animals, but 15% of respondents do not intend to grow any dry season crops even if animal grazing is stopped.

Of the 85% of respondents who wanted to grow crops during the dry season in the future, almost all respondents stated their reason was because there would be no more damage caused by free grazing animals (83%). Only 17% of respondents wanted to grow dry season crops because they need money and food.

Reasons for not wanting to grow dry season crops are cited below:

> *"Because I am getting old, and therefore just want to focus on raising livestock".*
>
> *"Because a Chinese company that works in partnership with the Ministry of Agriculture wanted to rent my land".*
>
> *"Because I have no labour and time".*

## V. Discussion and Conclusion

In general, there are six types of animal control practices currently applied in Natarbora. They are 1) fencing of livestock, 2) tethering, 3) free grazing, 4) zoning, 5) fenced/tethered at night and free grazing during the day, and lastly, 6) fencing off farmland. Nonetheless, there are respondents who maintained one type of animal control practice over the year and others who change their animal control practices depending on the season.

Currently the most common animal control method used by respondents is tethering (44%). Similarly, respondents perceived the most effective animal control method to be applied during the dry season in the future as tethering (33%). Reasons for selecting this practice are because tethering makes it easy to control animals, easy to catch or to keep animals tamed. However, the problem with this practice is finding suitable places to tie animals up. According to field observations and interviews, some farmers divided their farmland into two. Half of the land is used to raise livestock during the dry season and half of the land is used to grow crops. There are also livestock tied up around the residential areas, which can

pose as health risks for the communities through contamination from unmanaged animal manure.

Although existing village regulations promote animal zoning as an effective animal control method, current areas designated as animal zones lack water and are too remote as elaborated above. Accordingly, respondents argue that some livestock have escaped and became wild. Farmers also might not have time and labour to regularly travel such distances to check on their livestock. Fencing the animal zone could allow livestock to roam freely whilst keeping them contained within a specific area. This can in turn reduce work load for livestock owners, as well as address tensions and disputes concerning crop and property destruction by free grazing livestock. In addition, such a strategy can free up household farmland currently used to raise animals. However, fencing at such as scale will require inter-village cooperation and coordination.

Animal control is not the main challenge deterring sampled farmers to cultivate dry season crops. As our findings show, the top three challenges faced by farmers during the dry season are the lack of water (27%), farmers have other income sources (23%) and they are busy preparing farmland for cultivation in the wet season (17%). Only 11% of respondents stated animal control as one of the challenges to cultivating during the dry season. Considering the small sample size of this survey, future research can build on these preliminary findings to examine the significance of each barrier to dry season farming within a larger representative sample.

Since most respondents obtain income from selling livestock in the dry season and this is the second most important income source after maize during the wet season, programs or projects focused on livestock can encourage and explain to farmers the potential benefits of proper animal management practices such as fencing, tethering or using animal zones to raise livestock. When farmers understand the benefits of proper animal control practices mentioned earlier, this might increase the number of farmers who grow crops during the dry season, especially mung bean after rice – an innovation that does not require much water, time and labour when implementing it.

Finally, the head of village of Aubeon recommended AI-Com to organize a seminar in Natarbora to discuss the effective ways to control animals during the dry season. The goal of this seminar is to give an opportunity for villagers residing on the lowland area to discuss and decide together on the effective or proper ways to control livestock during the dry season.AI-Com is currently planning to hold this seminar in coordination with local leaders within this year.

# VI. APPENDICES

## Appendix 1: Animal control practices in the target villages


Figure 2 Sample of fencing farming area and water tank prepared during dry season, taken in Uma Bocu village.

Figure 3 Sample of fence built to fence livestock, taken in SiconeDiloli village.

## Appendix 2: Unofficial translation of village regulations on animal management formalized with *tara bandu* in the target villages

**CHAPTER 8: REGULATIONS ON ANIMAL MANAGEMENT**
(Uma Bocu and Abat Oan village regulations, 2017, pp.13-14)

The following village regulations were translated from the original text: *Regulamentu iha Suku Uma Bocu ho Abat Oan 2017.*

**Article 21: Basic Principle**
People who raise animals should control their animals and protect them from damaging other people's crops. Do not let all kinds of animals roam freely, except chicken and dogs.

**Article 22: Regulations on animal control**
Everyone who raises animals are responsible to control or manage their animals based on regulations as listed below:

1. Roam or fence their animals in the designated animal zone areas.
2. One of the family members must be responsible for looking after animals if the animals are roamed freely.
3. Raise small animals in permanent farming area or in areas identified to raise small animals.

**Article 23: How to solve crop damaged by animals**

1. If animals destroy other people's crops, animal owner has an obligation to pay cash or fine to crop owner.
2. If animals destroy crops, crop owner have the right to catch the animal and report to head of hamlet and animal owner.
3. In Abat Oan, animals that enter other people's farm will be killed immediately. For Uma Bocu, the crop owner needs to remind animal owner twice before taking further action.
4. Individuals who decide to farm in the areas designated as animal zones need to build fence on their farming area.
5. If the animals are roaming freely without any branding/sign (for instance: put a mark on any part of the cow's back to differentiate from other peoples' cows) are considered as wild animals. The crops owner has the right to kill the animal.
6. People who raise animals need to brand/put a sign on them.

## CHAPTER 8: REGULATIONS ON ANIMAL MANAGEMENT

(Aubeon and Sicone Diloli village regulations, 2017, p14)

The following village regulations were translated from the original text: *Regulamentu iha Suku Aubeon ho Sicone Diloli 2017.*

**Article 21: Basic principles**

People who raise animals should control their animals and protect them from damaging other people's crops.

**Article 22: Regulations on animal control**

Everyone who raises animals are responsible to control or manage their animals based on regulations as listed below:

1. Fence animals and let animals roam in the designated animal zones. Fences need to be built on farming area.
2. One of the family members must be responsible for taking care of large animals if they are free roaming.
3. Raise small animals in areas designated or fenced around farming area.
4. For those who want to sell animals, they need to have a permission letter from local authorities.

**Article 23: How to solve crop damaged by animals**

1. If animals destroy other people's crops, animal owner has an obligation to pay cash or fine to crop owner.
2. If animals destroy crops, crops owner has the right to catch the animal and report to head of hamlet and animal owner.
3. If animals enter other people's farming area and destroy crops, animal owner has an obligation to compensate based on the extent of the damage.
4. People who raise animals need to brand/put a sign on them.