

## **MANAGEMENT PRACTICES OF AN EMERGING RABBIT PRODUCTION**

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### **ABSTRACT**

Rabbit meat can contribute to the sustainable development goal (SDG) for food and nutrition security and poverty alleviation since there is an upsurged interest in rabbit farming in the country. The study aimed at documenting the management practices of the emerging rabbit producers in terms of housing, feeding, breeding, and health and disease management. The study uses qualitative-descriptive research, which utilized in-depth semi-structured interviews with 33 rabbit producers, a snowball sampling technique was used to identify the respondent. Findings revealed that in terms of housing practices the majority of the respondents use cages of different sizes depending on the rabbit's growth, mostly made of galvanized wire but some use local materials such as bamboo and used wood. For feeding practices, the majority use a combination of rabbit pellets & forages. While for breeding practices, they practice reproduction and care management, and weaning of kits. For health and disease management, the most common disease of the rabbit was diarrhea and skin disease, experienced by mostly young rabbits to adults. Respondent has knowledge in curing diseases of rabbits and can identify symptoms. With the increasing rabbit production, management practices currently utilized by rabbit farmers have an impact on the rabbit performance, and it needs to determine and provide information to make the venture profitable.

**Keywords:** Rabbit Production, Rabbit Farming Management Practices, Health and Disease Management, Breeding Practices, Feeding Practices

## 1. INTRODUCTION

Rabbit (*Oryctolagus cuniculus*) farming is a fast-emerging alternative to livestock, and this can support the sustainable development goal to stop hunger, realize food security and upgrade nutrition and encourage sustainable agriculture (SDG2).

With the high demand for animal products, another sustainable source of protein needs to be considered (Akinmutimi 2007). Among the existing options, the rabbit (*Oryctolagus cuniculus*) has been recognized as an appropriate alternative (Hassan et al 2012; Mailu et al 2013) since it has unique features such as high prolificacy, fast growth rate, lower input requirements, better feed usage, and valued output products such as meat, pelt, manure, and urine are among the valued potentials of rabbits (Mutsami and Karl, 2020; Kale et al., 2016).

The domestic rabbit (*Oryctolagus cuniculus*) is one of the rare species normally kept as companion animals and who are also cultivated for their meat and fur and also used for research (Oxley et al., 2018) and recommended as an alternative source of dietary protein for the increasing human population in developing countries like the Philippines, where animal protein is in short supply (El-Raffa, 2004).

Rabbit meat is one of the healthiest meats available to man; compared to other livestock that was acknowledged by USDA, it is also richer in protein, vitamins, and minerals (Kunnath, 2017; Lebas et al., 1997). Rabbit meat is white and has necessary features which include low fat, sodium, and cholesterol contents but high protein content when associated with other meats (Bodnàr and Bodnàr, 2014). Furthermore, rabbit fat has fewer stearic and oleic acids and high proportions of essential polyunsaturated linolenic and linoleic acids (Kunnath, 2017). These qualities make rabbit meat higher than other meats, thus creating demand for a health-conscious market.

Other features of rabbits are multi-use animals and can be as pets, and used as laboratory and experimental animals ((Fanatico and Green, 2012). Their fur has been used in garments and furniture. The rabbit's foot was considered a good luck charm for centuries, and even rabbit manure and urine are used as fertilizer (Veneracion, 2017; Cheeke, 1986; Schiere, 2004).

Hence, small livestock such as rabbits has a number of characteristics that might be advantageous to the smallholder, a subsistence-type integrated farming and gardening food production systems in developing countries (Cheeke 1986) just like rabbit raiser in the Philippines.

According to Hubilla in her article "Road to Rabbit Farming: Guide in Raising Rabbits as an Alternative Meat Source", the rabbit industry is not new in the Philippines. Though, it is not

familiar as well. Even though there are several rabbit farms within the Philippines, these statistics are still inadequate to create an industry-recognized and acceptable; this will be attributed to the society or market disapproval of the idea of consuming rabbit meat.

In the Philippines, rabbits are normally kept as charming pets. However, with the increase of pork amid the ASF and coronavirus pandemic, Filipinos look for an additional source of protein and consider eating rabbit meat. This was supported by a position paper of the Department of Agricultural and Applied Economics of the University of the Philippines Los Banos which state that now could also be the time for the country to prospect and start discovering alternative protein sources."

Currently, there has been an increased interest in rabbit farming in the country with the emergence of many new rabbit farmers and the formation of distinctive self-help organizations like the Association of Rabbit Meat Producers, Inc. (ARaMP, Inc). that help the growth of the rabbit industry in the Philippines (Veneracion, 2017). This organization hopes that with proper support and consumer awareness, rabbit production will emerge as an alternative solution to hunger, undernourishment, and poverty.

Furthermore, in the recently concluded 1st National Rabbit Congress last February 2020, Honeylet Nicolas, DVM, Ph.D., presented various reasons that most probably will make the public recognize the growing rabbit industry in the country. This includes rabbits are low-ranking in the food chain; rabbits are farmed and slaughtered all over the world and are considered high-value products; rabbits are productive, climate adaptable, and easy-to-care livestock; rabbit meat is considered one of the healthiest meats; the protein content rabbit meat does not convert into uric acid which makes it not dangerous for the health of the consumer; it does not compete with humans' sources of food. It can be fed with grass or hay but anything beyond that is a treat.; There is an array of by-products in rabbit farming, such as the rabbit feet which are considered amulets believed to bring good luck, tails may be converted into key chains, and furs are used to produce garments.; It can be easily raised by any gender and status like women and children and compared to other livestock that requires optimal strength from men.; Rabbits do not have any zoonotic disease that can wipe out their population, and rabbits do not contribute to noise pollution, unlike other livestock like pigs that oink or chickens that cluck (<https://www.agriculture.com.ph/2020/05/20/from-why-rabbits-to-why-not-rabbits/>).

Currently, there are no studies on rabbit production in the Partido area of Camarines Sur, Philippines could be found in literature since the interest in rabbit farming is just emerging in the area. Therefore, there is limited information on rabbit production in the area. However, with the increase in the production of rabbits, management practices currently utilized by farmers have an

impact on rabbit performance and it needs to be determined to capacitate the rabbit farmers to make their venture profitable.

The main purpose of this study is to document the management practices of Rabbit meat producers in the Partido area. Specifically, it aims to answer the following objectives: identify the characteristic of the rabbit producer and their rabbit farm operation; document the management practices of rabbit meat producers in terms of housing management, feeding management, breeding management, health and disease management, and other routine management practices; and determine the opportunities and challenges in the management practices of rabbit farmer meat producer.

## **2. MATERIALS AND METHODS**

A mix method of qualitative-quantitative research design was utilized to document the management practices of the rabbit producers in their rabbit production. Due to the few number of rabbit farmers and the lack of comprehensive lists of rabbit farmers in the municipal agriculture office a snowball sampling technique was used to identify thirty-three (33) rabbit keepers for the study. A cross-sectional survey was then carried out and data was collected using a structured questionnaire which was pre-tested and then modified as necessary before being administered.

Oral consent was provided by the rabbit keeper/producer respondent to participate in this study after a short orientation of the research objectives. Confidentiality was assured in their responses and the voluntary nature of the interviews.

The research questionnaire used in this study was developed based on published literature on management practices in rabbit production. The first part of the questionnaire was the characteristics of the rabbit producer's respondents which includes sex, age, and education attainment. Followed by the characteristics of the rabbit farm operation which include a number of years in rabbit farming, the method of acquiring rabbit breed, and the type of rabbit breed. Then, the second part includes questions on the four management areas of rabbit production such as housing practices, feeding, practices, breeding practices, and health and disease management practices. Finally, the third part was questioning the opportunities and challenges in rabbit production.

It uses descriptive statistics on the frequency and percentage of the characteristics of the respondent and their farm operation, and management practices in terms of housing, feeding, breeding, and health and disease management. According to Al and Bhaskar (2016), descriptive statistics provide a summary of the data and "try to describe the relationship between variables in a sample or population" (p.55).

Then, the responses were organized, categorized, and coded to enhance analysis and entered into the computer. The data generated were subjected to descriptive statistics and results in form of percentages were presented using tables.

### **3. RESULTS AND DISCUSSION**

#### **Characteristics of Rabbit Producers**

Table 1 reflects the characteristic of rabbit producers in the study area, that the majority which is 42% aged between 20 to 29 with a mean age of 35 years old, the oldest of 66 years old, and 18 years old as the youngest. This indicates rabbit producers are farmers who are looking for additional livelihood and food for their families. In terms of gender, the majority of the rabbit producers are male with 82% and 18% female. It was observed that males are more engaged in livestock than their counterparts. This gender disparity with a high predominance of men as family heads (Osei et al., 2012) and cultural beliefs that rabbit farming is meant for men and boys (Borter and Mwanza, 2011), also there was an observation that negates the historical perception that rabbit farming is a pastime activity for young boys (Hungu, 2011; MOLD, 2012).

Among the respondents, 51% or a majority of the rabbit producers are college graduates followed by high school graduates with 27% while the remaining 15%, 3% and 3% had college level, skill level, and elementary graduates respectively. This reflects that rabbit farming is increasingly undertaken by the educated (Cherwon et al., 2020). Hence, there is a positive relationship between farmers' level of education and productivity stated in several studies (Gasperini, 2000; Reimers and Klasen, 2013; Oduro-Ofor et al., 2014). Furthermore, Oduro-Ofor et al., (2014) noted that farmers with higher education levels can think critically, make better decisions and choices and it can easily adopt new farming technologies (Mendoza et al., 2008), which brings a positive impact on their productivity.

#### **Characteristics of Rabbit Farm Operation**

Table 2, shows the characteristics of rabbit farm operations in the study area, which indicate that majority or 58% started last 2020, the oldest was 2017 and the more recent was 2021. This indicates rabbit farming in the study area is just in its infancy stage. The majority or 61% of the rabbit producers had just started rabbit farming 1 to 2 years ago, followed by 3 to 4 years of experience in rabbit farming with 24% and there are 15% with less than 1 year experience. Kale et al (2016) state that rabbit farming continues to attract new farmers. However, for rabbit production to advance a new production system, it would take an average of 7 years to acquire the right attitude and parent stock availability (Borter and Mwanza, 2011). It will improve farm productivity once rabbit producers are better informed and gain more experience (Tembachako and Mrema, 2016).

In terms of the number of rabbits raised mostly rabbit producers invest more in a doe than a buck. This indicates that rabbit producer aims to increase their production by having more of a doe than a buck. According to ICAR 2011, for efficient breeding, the ratio of buck to doe should be 1 is to 5.

In terms of the method of acquiring rabbits, 64% or the majority are acquired from other rabbit breeders followed by acquired in the market with 24%, 9% uses both from rabbit breeder & market in acquiring rabbit, and 3% online. This is similar to the findings of Cherwon et al., (2020) which state that other rabbit breeders are the main source of rabbit stocks and with this practice, farmers are challenged on the quality and diverse breeds of rabbits including upgraded and/or imported rabbit (Oseni and Ajayi, 2008; Hungu, 2011). Therefore, with this practice of buying from other farmer breeders for the rabbit stocks, productivity and quality are affected (Kale et al., 2016) and this can also contribute to the spread of diseases between farms (Ogolla et al., 2017).

For the rabbit breed kept in the study area, it was reflected in table 2 the rabbit breeds and the three most commonly kept breeds are New Zealand (61%), Crossbreeds (61%), and Lion Head (36%). Several studies show similar results where New Zealand and Crossbreeds are part of the top three breeds utilized by the rabbit raiser (Cherwon et al., 2020; Hungu, 2011; Serem, 2014), the acceptance of that breed is connected with their good growth characteristics and high carcass weight. These two breeds are also commonly accepted as meat breeds (Mailafia et al., 2010) and together with their crosses, were reported to attain a live weight of 2 kg under tropical conditions within 12 to 15 weeks (Wanjala, 2015).

### **Management practices of rabbit producers in terms of rabbit housing, feeding, breeding, and health & disease management.**

An in-depth, semi-structured interview was conducted with the 33-rabbit producers. The aim of the interview is to ask the 33 rabbit producers about the management practices in their rabbit farming production. There are four areas in the rabbit management farming production practices that include housing practices, feeding, breeding, and health ad disease management. Several questions were asked for each area of management practices. Below are the questions for each area of management practices and the responses:

**Rabbit Housing Practices.** The questions asked were as followed: What is the housing you used for rabbit production? What are the materials used for rabbit housing? And, what are the housing maintenance practices you apply? Their responses were:

*For the housing of our rabbit production, I used a cage and the size of the cage varied depending on the growth stage of the rabbit. Like the grow-out rabbit, breeder and*

*hole breeder have different sizes of the cage. In terms of material, I use galvanized iron wire so that I can use it for a longer duration. However, when I start my rabbit production, I also used local materials such as bamboo and used wood.*

*My top three housing maintenance practices are keeping the cleanliness of my rabbit production areas, maintaining ventilation for rabbits so that they will not be dehydrated, and checking the cage if there are broken for the security of the rabbit.*

Majority or 97% of the respondent utilized a cage as their housing for their rabbit production (see Table 3). And 3% use both cage and free-range and another 3% use only free-range housing for rabbit production. This result is in the agreement with the findings of Moreki et al., (2019) that majority of the rabbit producer caged their rabbit.

In terms of the size of the cage, the majority of the rabbit producer did not follow the general size of the cage which is 2.5'x2'x2.5' (ICAR Research, 2011). Instead, they used varied sizes of cages depending on the stages of the rabbit. The rabbit producer used different sizes of cages for grower rabbit, breeder rabbit, and hole breeder rabbit. It was also observed that most of the respondents constructed their rabbit cage using locally available materials such as used wood, coco lumber, bamboo, chicken wire, rebar, tire wire, mesh wire, metal rods, bricks, flat sheets, galvanized iron for roofing & nipa. Other respondents purchase cages that are made of galvanized iron for longer use. The study of Moreki et al., (2019) and Moreki & Seabo, (2012) state the same materials were used by their respondent for the housing of their rabbit.

The housing maintenance practices of the respondents are the following: first, they regularly clean the housing which includes removing the stools of rabbits by scrapping using a spatula and washing the floors with rain water regularly. Second, they ensure the ventilation and provide an electric fan when the temperature is high particularly during the summer period. Third, they provide fresh clean water for drinking and replace/stock water in the container. The water containers must be refilled for an unlimited supply. Fourth, they disinfect once a month or clean once a month with diluted chlorine. Fifth, part of the cage maintenance is also the water system maintenance. Lastly, they changed some parts of the cage that is broken for example the wall made of wood & floor. However, with welded wired cages, there's no need to repair them from time to time, it will last long.

**Feeding Practices.** The questions asked were as followed: What do you feed the rabbit? How do you feed the rabbit? (Frequency of feeding and watering) Why? Where do you get the forages? And, what is the material/design used for feeding? Below are their responses:

*What do you feed the rabbit? How do you feed the rabbit? (Frequency of feeding and watering) Why?*

*I feed the rabbit using a combination of forage and rabbit pellets. As to how I feed the rabbit, I provide water constantly; I use pellet feeds once a day and if rabbits experience dehydration I give dextrose orally using 0.5 syringes.*

The majority or 70% of the respondents feed rabbits 2x a day, in the morning they feed rabbit pellets and, in the afternoon, they use forages for nutrient balance this was reflected in Table 4. It is necessary to have a nutrient balance to prevent dehydration and it saves time and energy. While other respondents provide unlimited forages. Similarly, several findings are parallel to this practice that the majority of the farmers fed their rabbits both forage and concentrates with the latter being fed only as and when one is able to afford them (Hungu,2011; Serem,2014; Cherwon et al., 2020). It is important to guarantee that animals obtain suitable quantities of stable feed which is unrestricted from toxins and chemicals if the output is to be maximized (FAO,2014).

Table 4 reflects that most or 94% of the rabbit producer respondents utilized both forage & rabbit pellets for feeding their rabbit production. This indicates that the rabbit producer maintains a balance of nutrients for the rabbit.

Table 5 shows the feeding and watering frequency of the rabbit producer respondent that the majority or 70% feed the rabbit twice a day, 24% as often necessary, and there are 6% that feeds only once a day. Likewise, Ogbonna (2015) in the Enugu state of Nigeria reported that the majority or 62.55% of respondents fed their rabbits twice a day however this is in contrast to the findings of Moreki et al. (2019) that 50% or a majority of the respondents fed and watered their rabbits once a day, i.e., early in the morning.

Table 6 shows the forages used by the rabbit producer and their scientific name. It was noted that there are twenty-seven (27) forages used by the rabbit producer reflected in Table 6 and the most common forages that they use are banana leaves (*Musa acuminata*), Napier grass (*Pennisetum purpureum Schumacher*), malunggay leaves (*moringa oleifera*), kangkong or water spinach (*ipomoea aquatica*), Madre de agua (*trichanthera gigantea*) with 48.48%, 48.48%, 36.36%, 36.36%, 21.21% respectively.

According to Mailafia et al., (2010) rabbit production can be combined into small farming systems, since the rabbits is being fed of crop residues, weeds, waste fruits, vegetables, and poultry droppings. Abu et al. (2008) stated that the diets of rabbits in Nigeria are mainly forages, grasses and legumes supplemented with kitchen wastes and agricultural by products such as dried cassava peels and wet milled cereal by-products. With the expensive cost of rabbit concentrate feeds rabbit producer continues to make use of forages in feeding rabbits a common practice as noted by Iyeghe-Erakpotobor and Muhammad (2008).



Various studies on farm rabbit studies have revealed that for most producers, the significant determinant of feeds offered to rabbits is the local availability (Aduku and Olukosi, 1990; Lukefahr, 1998; Chah et al., 2017). It was noted that this may be the result of the low level of commercialization of the rabbit enterprise as observed by Serem (2014) in many areas of the tropics.

Nevertheless, the use of forages alone cannot withstand the optimal productivity of rabbits therefore there is a need for supplements (Mailafia et al., 2010). Particularly the case of tropical grasses which are said to be relatively less digestible, low in protein, and high in lignin compared to temperate ones (Mailafia et al., 2010). Furthermore, rabbits raised on forage only have been observed to grow at an inferior rate hence taking longer to achieve slaughter weight (Wanjala, 2015).

**Breeding Practices.** The questions asked were as followed: What is your Reproduction management practices for your rabbit production? What is your care and management of newly born kits? How? Please elaborate. What is your weaning of kits practices? Please elaborate. And how do you give the identification number for the new breed? Below are their responses:

***What are your Reproduction management practices for your rabbit production?***

*The following are the reproductive management practices of rabbit producers: first, usually the first set of four (4) doe breeders to one (1) buck breeder. After a month, another set of four (4) doe breeders of five (5) months old and ready for stud. However, frequently the doe is ready for stud when it is six (6) months old. When the doe is 6 months old, it is ready to stud and I place the doe to buck cage. Then I removed the doe when it gets pregnant, and it starts weaning the kits. I give the B-complex to guarantee the health of the breeders and kits. Typically, after weaning I injected the rabbit with B-complex within 15 days, two (2) times a week since that is the recovery stage. Second, I give time to rest the mother doe after birthing. I wait until the mother doe recovers her body and usually it takes one (1) and one half (1/2) months Then, I carry the doe to the cage of buck for stud after one (1) month and one half-day of weaning. During weaning daily monitoring, checking of foods and water, and cleaning of cage and housing are essential. Third, I follow the forty (40) days interval of before and after stud and giving birth of a doe. Fourth, I place the doe in the buck cage for mating and separate it after 3-5 successful mate done in the morning or evening. Fifth, I observe proper care in handling breeders and kits. I introduce feeds and food that can produce milk content and give them vitamins as supplements. Six, I constantly replace buck to avoid in-breeding. Lastly, I do crossbreed like New Zealand and California White which produce F1 breed.*

The response of the rabbit producer is similar to the study of Moreki et al. (2019) which shows that one of the ratios of breeding buck to does was 1:5 which is similar to the practices of the rabbit producer in this study. Several studies that reflect other ratios of breeding buck to does are 1:6 (Gono et al. 2013); 1:10 (Sicwatan and Stahl, 1982; and Moreki et al., 2019). However, in an intensive system, a buck can serve 7 to 8 does and 10 to 15 does in the extensive system (Lebas et al., 1997).

The American rabbit breeder association recommended twice the 90-day kindling interval 45 days (ARBA, 2012). The grouping of longer kindling intervals with a slight average weaning litter size would have an effect on the profitability of the rabbit enterprise as this translates to smaller amount animals for sale and/or slaughter for home consumption. However, the respondent of this study only practiced (40) days intervals before and after stud and giving birth to a doe.

***What is your care and management of newly born kits? How? Please elaborate.***

*The following are the care and management of newly born kits I practice: first, I put breeder boxes or plastic try before kits are born so that the mother doe will give birth there, and nurse the kits until they are big. I also increase the food of the mother doe supplementing her with malunggay (Moringa oleifera) for better milk production. Second, I see to it that nesting trays intact with dry leaves and ventilation is adequate not too hot and not too cold, and milking doe is nursing them frequently. I used plastic trays with holes so kits will not fall on the ground and feces and urine secretes easily under the cage. Third, I checked them regularly w/o touching them, if they are sucking milk or if the mother doe breastfeeding them. Avoid touching the kits and do not allow outsiders to prevent stressing the kits and the mother doe breeder and also to avoid some diseases and contamination. Touching newly-born kits must be prevented. Do not touch the mother doe breeder so that it will not stress them but after two (2) weeks little touch will do for the meantime then hold now the kits freely. However, the mother doe takes care of her kits, I make sure that food & water is always available. I double the foods or pellets for the lactating doe. Forth, I always maintain the cleanliness or bucking tray, I seldom use vets, and biologics & vitamins I regularly monitored. Fifth, I transfer the kits after one (1) month into a different cage but near the mother to avoid stress and after 40 days I transfer them into the cage in groups and I always visit and check if there's something wrong and make sure they are not accessible from predators like cats and dogs.*

***What is your weaning of kits practices? Please elaborate.***

*Weaning of kits practice that I had is I transfer the kits to other cages after one (1) month or I put them in a grow-out cage. I feed and put some clean water after 25 to 30 days when I separate the kits to another cage. I maintain the proper cleanliness; I give solid food to the kits to eat w/o their mom's milk. And simply removed the mother doe from the cage and start adding more water and food. When the kits are eating solid food, they will be no longer interested in nursing. Also, I feed them grass & grower pellets after one (1) and 1/2 months.*

***How do you give the identification number for the new breed?***

In terms of giving an identification number for the new breed, the majority of the respondent around 67% just familiarize themselves by breed, age, features, and size or memorize mentally which was reflected in Table 7. Some use a blackboard for recording the names given to the rabbit and some use calendar and put it in separate cages. While others use both recording and familiarization of its breed & age. However, there is 6% who name every bunny, including their birthdate. One respondent shared his experience that on his 1st breed it has an identification the name, date of the breed but at present mostly familiarization but still I have ID's clipped at the front of each cage. And there were 27% of the respondent who is not yet practiced giving identification for the new breed. Poor keeping of breeding records was observed in the study area which could lead to inbreeding. Kristensen and Sørensen, (2005); and Nagy et al., (2012) highlight those inbreeding leads to an overall drop in the performance of the animals due to reduced growth rates and an increase in both mortality and frequency of hereditary defects.

**Health and Disease Management.** The questions asked were as followed: Does your rabbit experience disease? If yes, what are the common diseases of your rabbit? Who is usually affected by that disease? Do you have the knowledge to identify the symptoms of rabbit disease? How do you treat/cure the disease of rabbits? What do you do if rabbits have a disease? What medicine do you use for curing or treatment of rabbits with disease? What prevention do you do to prevent disease? Below are their responses:

***Does your rabbit experience disease? If yes, what are the common diseases of your rabbit?***

Figure 1 illustrates the common rabbit disease experienced by the rabbit producer, the majority or 52% experienced skin diseases of rabbits such as mange and ear mites. Followed by diarrhea, dehydration, flu, and heat stroke with 36%, 5%, 5%, and 4 % respectively. The result of the study was similar to the findings of Moreki et al., (2019); Aleri et al. (2012); and Moreki et al. (2011) that skin disease like ear canker was the most

predominant parasitic infection of rabbits, and Okumu et al., (2015) reported mange also a skin disease as the most important diseases affecting rabbits. According to Borter and Mwanza (2011), ear canker was the result of poor hygiene and the mite attack on the ears. Also, mange which is caused by mites has become a common and major constraint in rabbit production (Elshahawy et al., 2016). Chah et al. (2018), emphasize that mange causes rabbits to lose appetite, and body condition and stunts the growth rate, and it is vastly transmittable which can spread easily between sick and healthy rabbits. Also, leads to economic losses and animal welfare problems on rabbit farms (Sharun et al. 2019).

While Serem (2014) found diarrhea, mange, and bloat to be the most common and Hungu, (2011) stated diarrhea and bloat.

***Do you have the knowledge to identify the symptoms of rabbit disease?***

Majority or 79% of the rabbit producer respondent have the knowledge to identify the symptoms of rabbit disease, others around 9% have none or have not yet experienced rabbit disease for their rabbit production, these are farmers who are just starting rabbit farming. While there are around 12% with little or no much knowledge of rabbit disease and do not often experience the rabbit disease.

These findings are similar to Moreki et al., (2019) that majority of the respondents can identify signs/symptoms of rabbit diseases such as discharges around the eyes, ears, nose, or anal area; loss of appetite; depression; diarrhea; head tilt; loss of balance and labored breathing. However, despite the respondents' ability to identify signs/symptoms of diseases they cannot verify or consult animal health practitioners regarding the symptoms of the disease since they are not available in the study area. This indicates or confirms that breeders' information on disease control using modern medicine was limited. Furthermore, the study by Hungu et al. (2013) observes that despite the fact that farmers' ability to recognize rabbit disease symptoms/signs they still would not seek treatment for their rabbits from animal health practitioners even if they are available.

***Do you have knowledge about curing the disease of rabbits? Please elaborate.***

*I have knowledge in curing the disease of rabbit-like if a rabbit will have mange, it was because the cage is not cleaned and it was wet and I cured it with Madre de cacao on the affected part and sometimes I add VCO. I also give Ivermectin orally thru water intake as often as necessary to cure mange the disease. I use both natural remedies (herbal Plants) and medicine. Another disease I experience with rabbits is when the rabbit has diarrhea, I give dextrose powder and vitamin b complex for rabbit malnutrition.*

Some of the respondents have basic knowledge and use natural remedies such as herbal plants like if the rabbit has flu, they gave them oregano leaf two (2) times a day. While other respondent mention that “they also observe the rabbit & search via online/internet for possible remedy of rabbit illness”. I also quarantine the rabbit if dehydrated, and I let them drink a dextrose powder mixture. However, during extreme heat I let them drink Gatorade.

The practices of respondents of this study in curing the disease of rabbit ear canker are the same in the following study Moreki et al., (2019), ear canker infection was treated by rubbing rabbits’ ears with cooking oil; rubbing the affected rabbit skin with used automobile oil and Aloe vera juice (Gono et al., 2013); and using glycerine, iodized oil or cresyl oil are effective against ear canker when applied frequently (Lebas et al., 1997). Also, ivermectin is effective against ear canker (Bowman et al., 1992).

***How do you treat/cure the disease of rabbits? What do you do if rabbits have a disease?***

*The following are the treatment or cure I practice when my rabbit experience disease: first, I give rabbit medicine. Second, I isolate the bunny from other rabbits if possible. Third, I provide vitamins to the rabbit. Fourth, the cleanliness of cages is important so that they will not be infested with ants. Fifth, I provide good food and water.*

According to Ogolla et al., (2017); and Chebet et al., (2018), the self-treating of sick rabbits by the keepers is widely practiced. In the study of Cherwon et al., (2020), this was attributed to poor accessibility of veterinary services/rabbit health experts and due to high cost. Similar to the findings of Schiere, (2004) that the lack of both veterinary drugs and animal health experts impedes rabbit farming in the tropics.

Ashfaq et al. (2014), emphasize that depending on traditional methods by farmers rather than seeking proper veterinary advice for livestock disease treatment is harmful to their incomes and the development of the industry.

Table 8 shows the treatment for each corresponding rabbit disease/illness.

***What prevention do you do to prevent disease?***

*The prevention that I do to prevent disease, first, I maintain the cleanliness of surroundings, cages, floor feeder pots & flooring. I apply spraying of insecticide on the flooring, and fences, the urine is constantly removed & washed off of the water, and I dispose of the rotten foods. So that the surrounding is free from infected insects and ants. Comfortable surroundings are maintained to avoid skin diseases like rabbit mange & diarrhea. A cool environment is a must for rabbit production. Second, I give the rabbit*

*food and water. I wash the vegetable and always air-dry forages especially those w/ watery leaves before I give them to the rabbit. I change regularly their food & water container and constantly refill the water. Also, I regularly monitor the bunnies & their food intake. Third, I provide multi-vitamins and minerals to the rabbit daily for the stronger health of the rabbit and I put 1/2 tsp of dextrose powder once a week in the drinking water of the rabbit. Fourth, I isolate and give intense care once we notice the rabbit is not feeling well.*

Those responses of the respondents are similar to Cherwon et al., (2020), findings which highlight the disease preventive measures that include deworming, isolation of sick and/or newly acquired animals, and spraying of rabbit houses.

Overall, the health management and feeding practices of rabbit farming have huge consequences on their production performance (Martino and Luzi, 2008; Sanchez et al., 2012; Okumu et al., 2015).

### **Opportunities and Challenges in Rabbit Production**

For the opportunities and challenges in rabbit production, an in-depth, semi-structured interview was conducted with the 33-rabbit producers. It aims to interview/asked the 33 rabbit producers about the opportunities and challenges that they observe and experience in rabbit production.

Respondents were asked about the opportunities in rabbit production and if they are interested in meat production and processing. Below are some of their responses:

*“There are a lot of opportunities in rabbitry production. Selling, producing meat, and helping other locals engage in rabbit farming, I have a plan to engage in rabbit meat processing. I just need breeds that are suitable for it like upgraded rabbits so that I can produce meat in 3 months’ time.”*

*“One opportunity, is healthy meat, with more nutrients recommended by doctors. Yes, I have a plan to engage in meat processing, actually, I'm about to butcher one this coming month. The only problem is the low demand for rabbit meat. Other opportunities are: the urine of the rabbit can be used for pesticide in my backyard to avoid insects and ants; the poops of the rabbit can be used as organic fertilizer for plants and fruit-bearing trees, and the fur can be preserved w/ salt & dried (dry sun) for display”.*

*“It’s a big opportunity for income generation. Yes, absolutely starting to have the meat processed for home consumption. Hoping for the market to be widely recognized as additional meat for meat processing waiting to be established”.*

*“To sell them in quality, not quantity, I sell the rabbit when their age is 3 months to near stud (6 months old) with a high price that gives me higher income and there is the assurance to buyers of less mortality. Yes, I am open to rabbit meat processing, actually, my family had rabbit meat for their meals or for home consumption”.*

*“Opportunity in selling, more income, healthy & nutritious meat, high in protein, no fat (cholesterol), high in iron. Aside from that, I enjoy petting them. I love animals actually. I might consider trying if it is highly profitable and if not, I may stick to selling young adults and month-old bunnies. I suggest, educating people to adopt this alternative meat substitute to swine meat and chicken which is expensive & fatty. And have an intensive marketing strategy for increasing the awareness of the consumer regarding rabbit meat”.*

*“The opportunities for my rabbit is to help me earn money to buy my needs and to help me in my schooling finances. I have a plan; I am planning to produce meat-type rabbits and fancy/pet-type rabbits”.*

The majority of the respondent engages in rabbit production for income generation. It was observed that while some started rabbits as a pet, however, with the opportunities of generating income from rabbit production they shifted from rabbit as a pet to rabbit production. Then, it was noted that other respondents try to consume rabbit meat as additional food for their household and eventually start selling rabbit meat and rabbit meat processed. It was also observed that other respondents when starting their rabbit production intention was to sell rabbit breeds and rabbit meat to offer an additional option for meat in the market. Furthermore, it was noted that the majority of the respondents are open to opportunities for rabbit meat production and processing.

For the challenges in rabbit production, the respondent was asked two (2) questions: what are the challenges in your rabbit production? And, what do you think is your limitation in your rabbit production? Below are some of their responses:

*“The challenge is the awareness of people about eating rabbit meat since most Filipinos see bunnies as cute pets. My limitation is I cannot expand if the demand for rabbit breed and meat is low & production cost is high. Bunny prices are dropping as of the moment”.*

*“My greatest challenge is the market for rabbit breed and meat. I have a lot of production and fewer buyers so I had a problem with the maintenance expenses of rabbit production”.*

*“Here are the challenges I experienced with the mortality of rabbit kits and breeders. Lack of forages & technical know-how. The idea and information on how to have good quality rabbits. I need the technology and information that can help me in breeding and taking care of this rabbit production”.*

*“Sometimes there's a low demand for rabbit meat and bunnies so there's no profit at all. I breed them if the demand for rabbit meat is high”.*

*“I am still learning and recalling what I had learned in the past year about how to handle rabbit production. The challenge I experience is more on the mortality rate & marketing the live rabbit which has a low demand”.*

*“The following are the challenges I encountered: the availability of good replacement bucks to avoid inbreeding; I observed females are fast selling their male counterparts; limited buyers which is usually the breeder only; there is no available market yet for rabbit meat and the price for the material in building cages.*

Table 9 reflects the challenges experienced by the rabbit producer. The two (2) major challenges are inadequate/limited knowledge of rabbit production and an unreliable market for rabbit production and meat. This is similar to the findings of Odinwa et al., (2016) that lack of proper awareness and poor marketing channels are the challenges in rabbit production.

Earlier studies recognized challenges faced by rabbit producers to diseases, environmental conditions, skills deficiency, predation (Baruwa, 2014; Kale et al., 2016), failure to purchase good quality feed (Dairo et al., 2012), lack of access to market (Baruwa, 2014; Kale et al., 2016; Tembachako et al., 2017) which are part of the inadequate/limited knowledge of rabbit production.

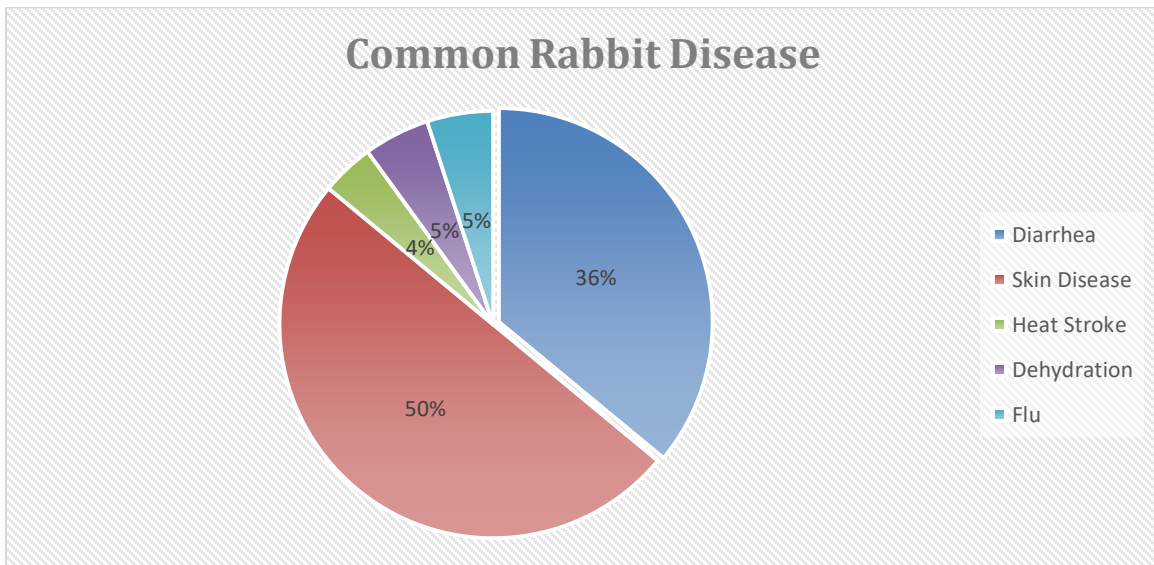
Other challenges mentioned by the respondents of the study are the weather, time-consuming and limited space for rabbit production, price of cage & production, lack of awareness of people in eating rabbit meat, higher production cost, and unreliable source of rabbit breed. This is supported by the study of Ouertani et al. (2016) which reported high feed expense and quality of feeds to be major challenges in the development of the rabbit subsector in Tunisia just like in the Philippines.

Critical environmental conditions such as heat stress, poor stock, and poor diet quality are one of the key challenges to the development of a viable rabbit industry in Africa (Oseni & Lukefahr, 2014) which is similar to the Philippines.



Other challenges identified in other studies include lack of access to credit and feeds (Moreki and Seabo, 2012; Ogbonna, 2015; Tembachako and Mrema, 2016). In addition, the lack of Government support, lack of research support, and inadequate extension/technical support are the challenges in rabbit production reflected in several studies (Dairo et al. 2012; Moreki and Seabo 2012; Ogbonna 2015; and Roy 2015).

**4. FIGURES AND TABLES**



**Fig. 1: Common Rabbit Disease**

**Table 1: Characteristics of Rabbit Producers**

<i>Category</i>	<b>F (n= 33)</b>	<b>P</b>
Age		
18 & below	2	6%
20- 29	14	42%
30-39	7	21%
40 – 49	7	21%
50- 59	2	6%
60 & above	1	3%
Gender		
Male	27	82%
Female	6	18%
Educational Background		
Elem Grad	1	3%

HS Grad	9	27%
Skilled	1	3%
College level	5	15%
College Grad	17	51%

**Table 2: Characteristics of Rabbit Farm Operation**

<i>Category</i>	<b>F (n= 33)</b>	<b>P</b>
Years started		
2021	4	12%
2020	19	58%
2019	4	12%
2018	4	12%
2017	2	6%
Method in Acquiring Rabbit		
Rabbit Breeder	21	64%
Market	8	24%
Both Rabbit Breeder and Market	3	9%
Online	1	3%
Rabbit Breed		
New Zealand	20	61%
Crossbreeds	20	61%
Lion Head	12	36%
California White/Dutch	7	21%
Local New Zealand	6	18%
Holand Lop/Lion Lop	2	6%
Palomino	2	6%
Hyla Optima	1	3%
Chinchilla	1	3%
Upgraded Flemish Giant	1	3%

**Table 3: Housing Used by Rabbit Producer**

<i>Type of Housing</i>	<i>F(n-33)</i>	<i>P</i>
Cage	32	97
Cage & Free Range	1	3
Free Range	1	3

**Table 4: Feed Used for Rabbit Meat Production**

<b>Feed Used for Rabbit</b>	<b>F (n=33)</b>	<b>P</b>
Rabbit Pallet	2	6
Forage	0	0
Combination of Forage & Rabbit Pallet	31	94

**Table 5: Feeding and Water Frequency**

<b>Feeding and Watering Frequency</b>	<b>F (n=33)</b>	<b>P</b>
Ad libitum	8	24
Once a day	2	6
Twice a day	23	70

**Table 6: Forages Used for Feeding Rabbits**

<b>Name of Forages</b>	<b>Percentage</b>
Banana Leaves/Skin ( <i>Musa acuminata</i> )	48.48
Napier Grass ( <i>Pennisetum purpureum Schumach</i> )	48.48
Malunggay Leaves ( <i>Moringa Oleifera</i> )	36.36
Kangkong or water spinach ( <i>Ipomoea aquatica</i> )	36.36
Madre de agua ( <i>Trichanthera gigantea</i> )	21.21
Paragis or Wire Grass ( <i>Eleusine indica</i> )	18.18
Mulberry leaf ( <i>Morus alba</i> )	18.18
Sweet Potato leaf or Camote leaves ( <i>Ipomoea batatas</i> )	21.21
Synedrella ( <i>Synedrella</i> )	18.18
Hay grass ( <i>Timothy grass</i> )	15.15
Cabbage ( <i>Brassica oleracea var. capitata</i> )	9.09
jackfruit leaf ( <i>Artocarpus heterophyllus</i> )	9.09

mani-mani leaves ( <i>Arachis Pintoi</i> )	6.06
Bamboo Leave ( <i>Phyllostachys edulis</i> )	6.06
Palay Leaves ( <i>Oryza sativa linn</i> )	3.03
Indian mango Leaves ( <i>Mangifera indica</i> )	3.03
Maramais ( <i>Trypsacum laxum</i> )	3.03
Cassava leaf ( <i>Manihot esculenta</i> )	3.03
Vetiver grass ( <i>Chrysopogon zizanioides</i> )	3.03
Alugbati or Malabar spinach ( <i>Basella alba</i> )	3.03
Madre de cacao ( <i>Gliricidia sepium</i> )	3.03
Papaya Skin ( <i>Carica papaya</i> )	3.03
Oregano ( <i>Origanum vulgare</i> )	3.03
Lubi-lubi ( <i>Ficus pseudopalma</i> )	3.03
Cacao leaf ( <i>Theobroma cacao</i> )	3.03
Carrot ( <i>Daucus carota</i> )	3.03
Carabao grass ( <i>Paspalum conjugatum</i> )	3.03

**Table 7: Identification Practice for New Breed**

<b>Identification Practice for New Breed</b>	<b>F (n=33)</b>	<b>P</b>
Not Practicing Giving Identification	9	27
Practicing Giving Identification	2	6
Familiarization/Remembering/Memorizing	22	67

**Table 8: Rabbit Disease/Illness and Its Treatment**

<b>Rabbit Disease/Illness</b>	<b>Treatment</b>
Cold	Oregano Leaf and Ivermectin
Diarrhea	Caimito leaf, Dextrose powder, Diatabs
Skin Disease (Mange, Ear mites, & Parasites)	Ivermectin, Madre De cacao Leaves, Mince garlic, VCO, ointment
Wound	Betadine
Malnutrition	B-complex

**Table 9: Challenges Experience on Rabbit Production**

<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Time-consuming and limited Space	2	6
Weather	2	6
Price of cage & production	2	6
Inadequate/limited knowledge in rabbit production (technical Information)	10	30
Lack of awareness of people in eating rabbit meat	3	9
Unreliable market for rabbit production and meat	13	39
Higher production cost	6	18
Unreliable source of rabbit breed	2	6

## **5. CONCLUSION**

Rabbit farming in the Partido area of Camarines Sur is still in its infancy and on a small-scale basis where the number of rabbits kept may provide an additional source of protein and income to smallholder farmers. In terms of their management practices for housing, the rabbit producers maximize the use of local material for their cage when they start their rabbit farming and eventually use galvanize wire for its durability, and they also adapt housing maintenance practices. For feeding practice, the rabbit producers make use of forages to feed their rabbits however they also provide pallets for a balanced diet. And, they also maximize the forages available in their backyard. For breeding practices, the rabbit producers utilized reproduction management practices, care and management of newly born kits, and weaning of kits practices, however, they do not give identification for the new breed. While for health and disease management, skin disease is the common disease of the rabbit experience by the rabbit producers, they have knowledge in identifying symptoms of rabbit disease, how to cure the disease, and practice preventive measures.

The top two opportunities identified by the rabbit producers are it can generate additional income and food for their household while the challenges that they encounter were inadequate or limited knowledge in rabbit production (technical Information) and the unreliable market for their rabbit breed and meat production.

## **RECOMMENDATION**

The following recommendations are suggested based on the present findings of the study:

1. Technical information on rabbit farming such as housing practices, feeding, breeding, and health and disease management should be provided to the rabbit producers in the Partido area to improve their rabbit production management practices and level up from the backyard rabbit raising to a semi-commercial. To quickly disseminate technical information to farmers, digitalization or online seminar or material will play a key role.
2. Extension activities should be strengthened in order to mobilize more farmers to venture into rabbit production.
3. There is a need to establish a massive market campaign and awareness for rabbit meat as additional food on the table and in households. In an effort to popularize rabbit farming, countrywide roadshow campaigns focusing on the nutritional attributes of rabbit meat should be mounted.
4. Further research in rabbit production management practices covering a wider area and a huge number of breeders is highly recommended.

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