Biosecurity Measures Applied in Rabbit Farms in the Volcanoes Region, State of Mexico

Tapia, R.M.Z[1,*], Gutiérrez, C.L.C[1]., Velázquez F.D[1]. and Peregrino R.D.R[1]

[1]Universidad Autónoma del Estado de México, Centro Universitario UAEM Amecameca.
*Corresponding author: uaem.zamira.tapia@gmail.com

Abstract

Rabbit farming has been carried out constantly in the Volcanoes Region in the last four decades; However, lack of knowledge of the environment where the production units are located persists, despite the development of the activity, since no in-depth investigations have been carried out. For this reason, it seems relevant to delve into this topic to carry out a detailed investigation of rabbit farming in the region and diagnose the situation regarding the use of biosafety measures and the application of preventive practices in production units (UPS). The initial general objective was to characterize rabbit production in the Volcanoes Region, pointing out the use of biosafety measures and adherence to preventive measures in the Ups. The study was carried out in the Volcanoes Region, located in the southeast of the State of Mexico, which has an inventory of 339 UPs, according to the 2007 Agricultural Census. In this sense, the study was carried out under a descriptive design by inviting the 22 producers of the Volcanoes Region in the State of Mexico through surveys applied to the personnel of the UPs on a percentage basis, during the period from August to November 2024. The study was cross-sectional and the data were analyzed in a specific manner, thus obtaining the situational diagnosis of rabbit producers in the region. Therefore, most UPs have the characteristics of a backyard or family; however, it is observed that some of the UPs have semi-intensive qualities. Likewise, a directly positive relationship can be seen regarding the implementation of biosafety measures with the specialized technical support that the UPs have received from the government.

Keywords: Rabbit farming, Current situation, Biosecurity, Preventive practices, Good livestock practices

Cite this Article as: Tapia RMZ, Gutiérrez, CLC, Velázquez FD. and Peregrino RDR., 2025. Biosecurity measures applied in rabbit farms in the volcanoes region, state of mexico. In: Farooqi SH, Kholik K and Zaman MA (eds), One Health Horizons: Integrating Biodiversity, Biosecurity, and Sustainable Practices. Unique Scientific Publishers, Faisalabad, Pakistan, pp: 176-180. https://doi.org/10.47278/book.HH/2025.123

A Publication of Unique Scientific Publishers

Chapter No: 25-024

Received: 25-Feb-2025
Revised: 17-Apr-2025
Accepted: 16-May-2025

Introduction

Situation of Rabbit Farming in Mexico, State of Mexico, and the Volcanoes Region

Small-scale rabbit farming is very common in the Volcanoes Region of the State of Mexico. This area includes towns like Amecameca and San Juan Teotihuacán. Through meat markets and tourists, this activity improves local economies in addition to household incomes (Lorenzo et al., 2020). Nonetheless, the industry has biosecurity issues, especially concerning illness prevention and management. Rabbit farming is the activity that consists of the process of raising, fattening, and reproducing rabbits to obtain the maximum benefit from their sale (Sánchez et al., 2024). Thanks to being a beneficial activity for farmers, at the national level, rabbit farming has had gradual growth as it is livestock work that does not require productive technology, as well as productive, reproductive, and economic control records (Flores, 2016).

Numerous diseases, most notably coccidiosis and Rabbit Hemorrhagic Disease Virus type 2 (RHDV2), can affect rabbit husbandry in the area. Studies have shown that coccidiosis, which is caused by Eimeria spp., is more common in the fall and winter (Lorenzo et al., 2019). In 2020, RHDV2 became a serious concern and quickly spread to other states, including Mexico, where 2,518 cases were reported between April 2020 and August 2021 (Lorenzo et al., 2024).

The FAO (1999) indicates that rabbit farming allows the possibility of improving the food security of small producers. Because rabbit breeding is relatively simple, it can generate economic income and improve the quality of the family diet, as production is dedicated to both self-consumption and small businesses (Burgin et al., 2020).

According to data from the Secretary of Agriculture, Rural Development, Fisheries and Food (SAGARPA), in Mexico, rabbit production is carried out mainly in family and semi-technical systems (SAGARPA, 2012). Rabbit farming in Mexico is growing, although it is still a livestock activity that has been given little importance, compared to other species (Reynoso et al., 2019).

The production of rabbit meat in Mexico began in the 1960s when it was considered a secondary activity to satisfy low-cost animal food needs (Castro, 2011). The INEGI (2007) reported the national production of rabbit meat, where 80% was family or backyard production, while the remaining 20% was carried out semi-intensively and intensively, where modern methods and techniques are used (Aceves, R., 2019).

In 2016, SAGARPA estimated that rabbit meat production exceeded 15 thousand tons. From this meat, we obtain ham, sausage, salami, and chorizo, among others. The entities with the highest rabbit production are: Puebla, Tlaxcala, Morelos, Michoacán, Querétaro, and the State of Mexico.

In 2012, the production of rabbit meat in the State of Mexico was approximately 2,340 tons, which allowed it to be considered the main

producer of rabbit meat and consumption. The municipalities of this entity that stand out most in rabbit production are Amecameca, Texcoco, Jilotepec, and Atlacomulco (SAGARPA, 2012).

Currently, the State of Mexico is where there is the greatest production, marketing, and consumption of rabbit meat, mainly in the area of the volcanoes, being an activity oriented towards the rural sector in the backyard and food subsistence, carried out by farmers of the region (Reynoso et al., 2019).

Espinoza and collaborators (2011) mention that, in the Volcanoes Region of the State of Mexico, rabbit production is developed at the family or backyard level, where the infrastructure and level of equipment are basic to intermediate. Some producers are a little more technical than others, although the majority are still family-owned, since the employees are generally family members, and they do not have the necessary records to be semi-intensive.

Backyard rabbit production represents 95% of production nationwide. This is related to agroecological practices such as the presence of diversified production systems, optimizing production factors, and making it a sustainable trend (Gutiérrez-García et al., 2022).

Rabbit farming is an alternative activity that has been developed in the context of national and global crises, which has been characterized by difficulty in accessing food. Due to this situation, the characteristics of rabbit farming, which allow ease in raising animals and producing meat, contribute to this activity being considered a tool for territorial development (Aceves., 2019).

Assessment and Recommendations

Although the government deserves appreciation for acting quickly to contain the RHDV2 outbreak, the event highlights the necessity of more robust farm-level biosecurity measures (Smith et al., 2018). There is room for improvement given the underutilization of medical records and the dependence on conventional methods. Among the recommendations are:

Education and Training: Putting in place courses to teach producers how to identify diseases, keep records, and use contemporary husbandry techniques.

Improved Sanitation: Promoting comprehensive and frequent cleaning procedures, such as the application of disinfectants and appropriate disposal techniques for waste.

Vaccination Programs: Creating regular immunization programs as a preventative measure, as well as during epidemics.

Monitoring and Surveillance: Establishing community-based surveillance programs to quickly identify and address disease outbreaks.

Producers of rabbits in the Volcanoes Region can reduce the danger of disease, enhance animal welfare, and guarantee the long-term viability of their farms by using these strategies (Grajales-Tam & González-Romero, 2014).

Good Livestock Production Practices in Rabbits in the State of Mexico

Rabbit farming is a relevant livestock activity in the State of Mexico due to its productive potential, low investment cost, and nutritional benefits of rabbit meat, whether in intensive production or it can be important to increase family income, especially all in the backyard system, which represents 95% of this activity in the country (Gómez, 2019 and Manjarrez-Martínez, et al., 2020). However, to guarantee its sustainability, it is necessary to implement good livestock production practices (BPPP), which seek to improve animal welfare, product safety, and the profitability of production units (SADER, 2021).

1. Adequate Nutrition

Correct feeding of rabbits improves their health and productive performance. Diets should include fiber (mainly through hay or alfalfa), quality protein, and clean water, available 24 hours a day (SENASICA, 2024). They need 420 to 160 ml of water per day, they must eat 15% of their live weight, and require green forage with a supply of vitamin C.

2. Facilities and Environmental Management

Ventilated spaces with controlled temperatures (16-20°C). It is important to note that the temperature usually varies according to the physiological stage, as indicated in Table 1. They require 16 of 17 hours of light for their reproduction and the noise intensity should not be greater than 60 decibels.

Hygienic and moisture-free surfaces. The design of the cages must prevent injuries and avoid overcrowding, ensuring animal well-being (SENASICA, 2021).

Table 1: Environmental temperature by physiological stage

Section	Optimal temperature (°C)	Critical temperature* (°C)
Maternity	16 a 20	10 a 25
Male	14 a 18	6 a 24
Inside the nest	31 a 33 (1ª semana)	31 a 33
Fattening (newly weaned)	23 a 24	10 a 30
Fattening (ether fases)	19 a 22	14 a 26

* Below the minimum value and above the maximum (SENASICA, 2019)

3. Health and Biosafety

It is essential to implement sanitary measures, such as the disinfection of facilities and equipment, thanks to which the risk of diseases is reduced (Rasool et al., 2023). In addition, vaccination programs, such as the one developed against Rabbit Viral Hemorrhagic Disease (RVHD), are essential to prevent outbreaks (SADER, 2021). Biosecurity in rabbit farming is essential to prevent zoonotic diseases and improve the quality of products on farms. In the eastern area of the State of Mexico, where rabbit production is important, implementing adequate biosecurity measures helps mitigate risks and improves the profitability of producers (SENASICA, 2021). Biosecurity involves a set of preventive measures that range from animal handling to cleaning and disinfection of facilities (FAO, 2010).

Key Biosafety Measures and Control of entry along Handling of Animals

The entry of people, equipment, and other animals into farms must be controlled to prevent the transmission of diseases. It is advisable to quarantine the new animals before integrating them into the productive group (SENASICA, 2024). In addition, access to outsiders must be restricted and ensure that staff wear appropriate clothing and footwear to minimize risks (SADER, 2021).

Cleaning and Disinfection

Regular cleaning of facilities and equipment is essential to reduce the microbial load in the environment. Disinfecting handling utensils, cages, and other surfaces frequently contributes to maintaining a healthy environment for rabbits (FAO, 2010). Disinfection must be carried out with approved products and following protocols established by health authorities (SENASICA, 2024).

Proper Waste Management

Rabbit droppings and food scraps must be handled properly to prevent the buildup of pathogens. In addition, waste must be disposed of safely and regularly to prevent the spread of diseases (SADER, 2021). This is especially important in the eastern area, where the proximity between farms increases the risk of contagion between nearby establishments (SENASICA, 2024). It is important to mention that the greater the intensity of the production system, the greater the amount of animal waste, therefore, it begins to be a potential problem. An efficient practice could be composting (SAGARPA, 2019).

Constant Training

Producers and farm employees must receive ongoing training on biosecurity practices, animal management, and disease control. Adequate training ensures that measures are implemented correctly and as effectively as possible (FAO, 2010). Local authorities, such as the National Agri-Food Health, Safety, and Quality Service (SENASICA) play an important role in the distribution of educational programs in the area (SADER, 2021).

In the eastern part of the State of Mexico, where rabbit production is significant, these measures must be applied rigorously to prevent disease outbreaks and ensure the quality of the final product (Miller et al., 2012). The implementation of cleaning protocols, entry control, proper waste management, and continuous training are essential for the success of rabbit farms (SADER, 2021; SENASICA, 2024).

4. Reproductive and Genetic Management

Planned reproductive management includes the selection of breeders with desirable genetic characteristics and the recording of births, matings, and weights. This guarantees a productive herd free of genetic defects (FAO, 2010). In Latin America there are very few reports on the conservation, characterization, and improvement of genetic resources in this species; In this regard, it is noted that only Cuba and Argentina (Angora rabbits) (Vázquez, et al. 2007) join a rabbit improvement program if management adjustments are made that reduce mortality and, simultaneously, if they are involved as a priority in selection of maternal effect variables (Vargas et al., 2019.

5. Staff Training

Producers and workers must receive updated training on topics such as proper rabbit management, cleaning, disinfection, and biosecurity. This ensures that good practices are implemented effectively (SADER, 2021).

Materials and Methods

The study was carried out in the Volcanoes Region of the State of Mexico, from August to November 2024, where the municipalities of Amecameca, Ayapango, Cocotitlán, Chalco, Ecatzingo, Juchitepec, Ozumba, Temamatla, Tenango del Aire, Tepetlixpa, Tlalmanalco and Atlautla. In this region there is an inventory of 339 rabbit production units, according to the 2007 agricultural census (INEGI, 2007).

A descriptive study was carried out by invitation, in which 22 producers from the Volcanoes Region participated, in the southeast of the State of Mexico. The study was cross-sectional, and the data obtained were analyzed specifically to obtain a situational diagnosis of rabbit producers in the region.

The first phase of the study consisted of identifying the key actors in rabbit farming in the region, including producers and veterinarians who know most of the rabbit farmers. Initially, contact and an approach were established with them to request their collaboration and make an invitation to participate in the study, for which they had to allow access to their production units. In compensation for supporting this research, advice would be offered on the site (Ringenberg et al., 2024).

During the second phase of the study, a previously established interview was carried out, which included productive aspects, among which the number of reproductive females, reproductive males, replacement animals, and offspring, as well as the facilities, use of biosafety measures used and, finally, aspects of technical and governmental support. Previously agreed-upon appointments were made with the producers to interview their production units.

Results

Production is characterized by the presence of breeds of European origin, such as New Zealand, California, and Black Aztec. The producing population is made up of adults with an average age of 46 years. However, it was observed that there are young people between 20 and 23 years old and adults up to 77 years old who carry out the activity. Regarding gender, it was observed that in 57% of production units, men hold responsibility, while in 43% of cases, responsibility is in the hands of women. The age of the activity is extremely variable, with values ranging from 4 to 50 years or more. The majority uses family labor, and only 4 producers have workers. The farms are made up of an average of 14

calves in production and 3 males, with 17% mortality in the fattening stage; 6 rabbits alive, 14 wombs in production; The female-male ratio is 8 females to 1 male, with a general production of 9.1 kits per litter (Camacho et al., 2010; Roca, 2006). With a band management of 42 days and a production of 8 liters per year. All farms have 100% roofing, although it is used differently: 51% metal or galvanized sheet roof, 13% asbestos, 18% canvas and cardboard, 27% corrals.

All production units report that the feed provided to the animals is a commercial brand, Purina® or Union® balanced feed. 32% indicate that they supplement with preened alfalfa, although they do not mention the exact amount of alfalfa that is added. This is a very common practice among producers.

Regarding the use and application of biosafety measures, some facilities were not specifically designed, so they have been adapted and adjusted for the activity. In biosecurity, only 71% of the members are implementing some measures, such as sunny and disinfecting cages (24%) and the use of rubber-based glue. 5% have more complete measures, such as sanitary mats disinfection with chlorine solution, and flaming of the cages at the end. 36% carry out vitamin management. 47% have deworming. On the administrative side, 93.3% are not aware of production costs due to the lack of economic records, while only 6.6% do know and record their expenses and sales.

Although none of the production units has basic equipment such as a hygrometer or thermometer, it is necessary to acquire them to keep records of environmental monitoring and thereby prevent possible respiratory diseases such as pasteurellosis. Regarding the control and replacement measures for livestock, mainly females, 86.4% of producers prefer to obtain them from their females rather than to acquire them from other farms, since they have observed that diseases such as rabbit viral hemorrhagic fever are devastating. once you enter the farm.

The analysis of productive evolution indicates that more than half of the UPs have seen an increase in their production and number of animals in the last year, which could indicate a positive growth in rabbit farming activity in the region. However, 13% have experienced a decrease, which could be an indicator of problems in the management and management of the activity. It is important to carry out a more detailed analysis to determine the causes of these trends and establish measures to maintain or improve the performance of the activity in the region. Also, 27% get government support in the form of a rabbit package that includes cages, females, males, and food for one year. With this, a direct relationship is observed between the production units that have received government and specialized technical support, with the application of biosafety measures, disinfection, and reduction in the mortality rate of the rabbits, this due to good livestock practices.

The only time for staff training is when they are offered support through these government programs, otherwise, they go to the veterinarian to correct health problems, but not for continuous training.

Conclusion

It is important to highlight that rabbit farming in the Volcanoes Region is an important economic activity and a first production model of its kind in the region. At the beginning, the lack of specialized technical knowledge and the lack of financial policies and government support do not make it a long-term activity. This can be achieved with the implementation of good practices and proper management; With this, it can become a very profitable activity for the region, helping local and regional development. It is necessary to promote the strengthening of technical capacities, implement marketing and action strategies, credit and financing, which suggests that the rabbit production activity in the area is stable and can be improved if appropriate measures are applied.

Good livestock production practices in rabbit farming make it possible to increase the quality and safety of products, improve animal welfare and ensure the sustainability of the sector. In the State of Mexico, these measures are essential to support small and medium-sized producers, who represent an important pillar of national rabbit production.

References

Aceves, R. (2019). Análisis económico de la producción cunícola en la región de los Volcanes del Estado de México, Tesis de Licenciatura en Medicina Veterinaria y Zootecnia, Universidad Autónoma del Estado de México.

ANCUM, (2010). Asociación Nacional de Cunicultores de México. Prospectiva. (http://www.ancum.org.mx/prospectiva.html).

Burgin, C. J., Wilson, D. E., Mittermeier, R. A., Rylands, A. B., Lacher, T. E., & Sechrest, W. (Eds.). (2020). *Illustrated Checklist of the Mammals of the World*. Lynx.

Camacho, A., Bernejo, L.A., Viera, J., & Mata, J. (2010). Manual de Cunicultura. Escuela Técnica Superior de Ingeniera Agraria Lleida, España.

Castro, D.E. (2011). Estudio de mercado de la carne de conejo en la zona sur oriente del Estado de México, Tesis de Licenciatura Universidad Autónoma del Estado de México.

Espinosa, E., Soto, H. A., Brunett L., Terán V. O. E. & Márquez M. O. (2011). "Impacto socioeconómico de la producción familiar de carne de conejo de la zona sur oriente del Estado de México". La ganadería ante el agotamiento de los paradigmas dominantes, Vol. I, Universidad Autónoma Chapingo

FAO (1999). Noticias e informaciones de la FAO. Cría de conejos para obtener alimentos e ingresos 12 de enero de 1999. Consultado 20 de diciembre de 2024. http://www.fao.org/Noticias/1999/990101-s.htm

Flores, D. J. A. (2016). Análisis situacional y propuesta de estrategias para apoyar el desarrollo de la cunicultura de tipo semi-industrial en el municipio de Texcoco, México. Universidad Nacional Autónoma de México.

Gómez, S.J.G. (2019). "Situación de la Producción Cunícula en México". Revista Mexicana de Agroecosistemas. Vol. 6 (Suplemento 2). file:///C:/Users/dell/Downloads/Congreso+AMPA_2019-Suplemento+2-82-87.pdf

Grajales-Tam, K. M., & González-Romero, A. (2014). Determinación de la dieta estacional del coyote (Canis latrans) en la región norte de la Reserva de la Biosfera Mapimí, México. *Revista mexicana de biodiversidad*, *85*(2), 553-564.

Gutiérrez-García, G., Espinosa-Ayala, E., y Márquez-Molina, O. (2022). "Evaluación de la sustentabilidad de la cunicultura de traspatio en el Estado de México mediante el método IDEA". Terra Latinoamericana, 40.

INEGI (2007). Instituto Nacional de Estadística, Geografía e Informática. Censo agrícola, ganadero y forestal. (http://www3.inegi.org.mx/sistemas/tabuladosbasicos/default.aspx?c=17177&s=est)

Jiménez, R. (2011). Estudio económico de la producción de conejo en la zona sur oriente del Estado de México, Tesis de Licenciatura Universidad Autónoma del Estado de México.

Lorenzo, C., Lafón-Terrazas, A., Fernández, J. A., Cervantes, F. A., & Martínez-Meyer, E. (2020). La enfermedad hemorrágica viral del conejo impacta a México y amenaza al resto de Latinoamérica. *Therya*, *11*(3), 340-345.

Lorenzo, C., Fernández, J. A., Hernández-Quiroz, N. S., Lafón Terrazas, A., & Tapia-Ramírez, G. (2024). Rabbit Hemorrhagic Disease Virus in Mexico in 2020–2021: Risk Areas and Climatic Distribution. *Viruses*, *16*(8), 1344.

Manjarrez-Martínez, N.R., Sagarnaga-Villegas, L.M., Salas-González, J.M., Martínez-González, E.G. & Montero-Vicente, L. (2020). "Factores que influyen en la viabilidad económica y financiera de la cunicultura en el Estado de México, México". Webinar de Cunicultura- WebiAsescu 2020. https://asescu.com/wp-content/uploads/2020/12/LActasWebiAsescu-2020___.pdf

Miller, R. (2012). Zoo and wild animal medicine current therapy.

Organización de las Naciones Unidas para la Alimentación y la Agricultura (FAO) (2010). Buenas prácticas para la industria de la carne de conejo. Recuperado de https://www.fao.org

Rasool, N., Farooq, A., Asrar, R., & Qureshi, A. S. (2023). Continental Veterinary Journal.

Reynoso Utrera, Emmanuel, Bautista Gómez, Linda Guiliana, Martínez Castañeda, José Simón, Romero Núñez, Camilo, García Rubio, Virginia Guadalupe, Aguado Almazán, Gabriela López, Hernández García, Pedro Abel, & Espinosa Ayala, Enrique (2019). "Análisis de la presencia de Rotavirus en conejos del Estado de México". Revista mexicana de ciencias pecuarias, 10 (2), 511-521. https://doi.org/10.22319/rmcp.v10i2.4638

Ringenberg, J. M., Weir, K., Linder, T., & Lenoch, J. (2024). Detections of rabbit hemorrhagic disease virus 2 (RHDV2) following the 2020 outbreak in wild lagomorphs across the western United States. *Viruses*, *16*(7), 1106.

Roca, T. (2006). Manejo en bandas en cunicultura industrial.

SAGARPA. (2012). Delegación en el Estado de México comunicación social.

SAGARPA. (2016). Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación. Todo sobre la producción de carne de conejo. México.

Sánchez, E. D. J. Q., de Anda, F. R. G., Sánchez, V. V., Rodríguez, N. E. R., & Zepeda-Velázquez, A. P. (2024). La historia del Conejo en México. Boletín de Ciencias Agropecuarias del ICAP, 10(19).

Secretaría de Agricultura y Desarrollo Rural (SADER). (2019). Manual de Buenas Prácticas de Producción de Carne de Conejo. México. Secretaria de Agricultura, Ganadería Desarrollo Rural y Pesca (SAGARPA).

Secretaría de Agricultura y Desarrollo Rural (SADER). (2021). Acciones conjuntas para proteger la cunicultura. Gobierno de México. Recuperado de https://www.gob.mx

Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA). (2024). Promovemos la bioseguridad en unidades cunícolas del Estado de México. Recuperado de https://www.gob.mx

Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA). (2019). Promovemos la bioseguridad en unidades cunícolas del Estado de México. Recuperado de https://www.gob.mx

Smith, A. T., Johnston, C. H., Alves, P. C., & Hackländer, K. (Eds.). (2018). *Lagomorphs: pikas, rabbits, and hares of the world*. JHU Press.

Vargas, K., Brown, D., Wisely, E., & Culver, M. (2019). Reinstatement of the Tamaulipas white-sided jackrabbit, Lepus altamirae, based on DNA sequence data. *Revista mexicana de biodiversidad*, *90*.

Vásquez, R., Martínez, R., Manrique, C., & Rodríguez, Y. (2007). Evaluación genética del comportamiento productivo y reproductivo en núcleos de conejos de las razas Nueva Zelanda y Chinchilla. Ciencia y Tecnología Agropecuaria, 8 (1), 69-7