Mortality rates prevention during hot season on poultry supply

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Abstract

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The poultry industry in Mexico has a very changing market throughout the year, when heat season arrives, supply changes drastically, increasing mortality rates of chicken, reducing production and generating shortages, as a consequence, creating a very noticeable bullwhip effect that negatively affect the market, hyperinflating prices and drastically reducing the quality of chicken meat, and its derivative products to meet with market demand; as a result, customer satisfaction is not achieved, revenue of chicken product distributors plumets, and the market stays unstable for month until distributors and production companies can stabilize price and quality to a normal standard.

This paper will focus of mitigating this phenomenon, targeting all existing procedures that are used by Mexican companies, and narrowing done main flaws in the existing supply chain, this with the intent of reducing and controlling chicken mortality rates, focusing on specific areas of opportunity to understand where improvements can be done, this to have a more stable market throughout the year.

Key words
poultry, heat stress, poultry breeding process, management practices, livestock imports

Table of Contents

1 Introduction

The poultry industry has a major role in the global market, being one of the main sources of protein available and one of the most available products worldwide. Poultry breeding, even though it's profitable and not too complex, can be challenging when high temperatures play an important role in the area where chickens are being farmed since heat strikes can lead to heat stress and massive losses in poultry farms, reducing productivity and incrementing significant waste (Nawab & Ibtisham, 2018). Heat strikes can increment stress in chickens since body temperature is not regulated easily, leading to a food intake decrease, lowering the immune system, and slowing production. This leading to high mortality rates causing, considerable loss if not controlled (Ensminger & Parker, 1986; Patterson & Wideman, 2008).

Within the poultry supply chain, its riskier stage occurs between the breeding and the processing stage; during these two stages, the safety of chickens must be prioritized since it's a stressful process that can lead to many risks like disease development, high mortality due to stress of environmental factors. These problems can be mitigated until certain degree; even though many prevention strategies have been applied throughout the years, a constant problem that has always been present it's the high mortality rates that occur mainly through the breeding process, many factors can contribute to this problem, but solutions to this problem are implemented when damage has already occurred and there are almost non prevention strategies for these scenarios. Stress caused by heat can lead to serious consequences specially in countries like Mexico that heat seasons are constant throughout the year and mortality rates tend to rise directly affecting market stability and the market supply (Hunton, 2006).

The main objective of these thesis it's to explore management strategies to reduce high mortality rates through heat season, promoting sustainable strategies to mitigate these risks and stabilize poultry supply. Poultry production companies can implement prevention strategies to reduce monetary loss and to decrease market volatility, this with the goal of having a stable market that has a constant supply which directly leads to more regulated prices generating a constant profit reducing important loses, improving customer retention and market flow.

1.1 Background

The primary learning goal will be to narrow down specific problems that the poultry industry has, to comprehend these market changes and "problems" to comprehend if they can be prevented and, if so, which methods can be used to do so in the best possible way. This direction has been taken for this thesis since this is a notorious problem that in the poultry industry, specifically in the chicken meat field. These factors affect in a negative way the market and this market fluctuations could be prevented in the root causes were investigated in a deeper level.

1.2 Research Question

To be able to answer this question properly, investigative questions have been developed to enhance the research and to provide depth in the chosen topics to effectively narrow down the main problems and to find the best possible solutions.

RQ: How can high mortality rates be prevented during hot season to stabilize poultry supply?

IQ1. What are the ideal conditions to breeding chicken successfully to ensure a stable supply through all year?

IQ2. Which key factors can be managed or improved to ensure the success of production from the breeding stage through to the processing stage?

IQ3. Which policies and regulations must be followed within the process, and how can they be arranged to reduce risks?

IQ4. Which factors would have to be considered for the import of poultry products to México to be feasible?

Table 1. Overlay Matrix (Author 2024)

Investigative Questions (IQs)	Theoretical Framework	Methods	Interview/Survey Questions	Data Analysis/ Results
IQ1. What are the ideal conditions to breeding chicken successfully to ensure a stable supply through all year?	-Breeding Process. -Mortality Control. -Transportation process.	-Quantitative and qualitative -Poultry breeding and productions companies -Qualitative interviews with logistics directors and veterinarian areas.	Logistics: Q1, Q3, Q5, Q8. Veterinary: Q1, Q2, Q3, Q4, Q5. Stakeholders: Q2, Q4.	This phase will help to give the main areas of opportunity to analyze and make comparison with past result and procedures that can be improved
IQ2. Which key factors can be managed or improved to ensure the success of	-Breeding Process. -Mortality Control -Transportation process.	-Quantitative and qualitative -Poultry breeding and productions companies -Qualitative interviews with logistics directors and veterinarian areas.	Logistics: Q4, Q7. Veterinary: Q2, Q3, Q4, Q5. Stakeholders: Q2	A pie graphic will be implemented her to visualize main topics that must be taken into account and show existing weaknesses of current production process

production from the breeding stage through to the processing stage?				
IQ3. Which policies and regulations must be followed within the process and how can they be arranged to reduce risks?	-Breeding Process. -Mortality Control. -Transportation process.	-Quantitative and qualitative -Poultry breeding and productions companies -Qualitative interviews with logistics directors and veterinarian areas.	Logistics: Q1, Q3, Q5, Q8. Veterinary: Q4, Q5.	From the qualitative response that will be received, data will be looked up to match the existing concerns and understand areas of opportunity where improvement can be done.
-IQ4. Which factors would have to be considered for the import of poultry products to México to be feasible?	-Poultry Imports feasibility.	-Quantitative and qualitative -Poultry breeding and productions companies -Qualitative interviews with logistics directors and veterinarian areas.	Logistics: Q8, Q9, Q10. Stakeholders: Q5, Q6.	Comparing pricing, quality and delivery times to Mexican factors will me imperative along with qualitative data offered by interviewees will provide necessary information to asses if it's a plausible option or not.

1.3 Demarcation

In this paper topics like poultry transportation, effects of heat in breeding process and imports and imports of poultry products will be included due to its high relevance to the topic since this topic will help narrow down main problems and possible solutions.

Focusing mainly on the planning stage of the supply chain, boarding topics on weak stages to remove to market demand, risk management criteria development to delegate links of the supply chain that affect poultry mortality rates and investigate utilizing surveys to calculate the impact of poultry shortage and its route causes.

Topics regarding productions of chicken meet, transport prom production phase to distribution since none of that information can change or influence the result or the investigative process of the paper.

1.4 International Aspect

Through put this paper many poultry breeding processes will be analyzed, even though mortality prevention will be the main focus of the paper, the import of poultry finished products will be also taken into account since this option can bring new products to the existing market helping stabilize the demand through shortage seasons, countries from Latin America (LATAM) will be taken into consideration for this process to effectible analyze all existing possibilities to obtain the most feasible option the answer the main question of the thesis.

1.5 Benefits

The main outcome of the paper is to provide feasible solutions for the volatile existing market, alternative solutions will be provided to attack and prevent poultry product shortages that happen during heat seasons which highly affect the existing market. This will give solutions that companies can use to improve their breeding process and new poultry suppliers to ensure a stable market.

1.6 Risk and Risk Management

Like all research projects, the author could come across some difficulties, the following chart shows some of the possible risks that the author might face throughout the making of this paper. This step is crucial to ensure that possible factors can affect the quality of the paper and to have available prevention plans in case these risks happen.

Table 2. Risk Matrix (Author 2024)

Risks	**Likelihood (1-3)**	**Impact**	**Prevention/Solution**
Information restrictions due to company policy.	1	Not so likely but can have a big impact.	Making the questioner structure to avoid delicate topics.
Not meeting with deadlines.	2	This risk even though can be manageable, its impact can be high since it can compromise the quality of this paper.	Scheduling time to work on the paper and good time management to make a complete investigation and data analysis.
Data misinterpretation	2	This risk it's on a medium level, it's possible that collected data can be misinterpreted leading to a unconclusive result	Making sure data collected comes from reliable sources to ensure the best results

There are not many possible risks regarding this topic since it does not involve sensitive information as it focuses on early stages of the complete supply chain that poultry companies utilize, this meaning that the risk of sensitive information leaks its non-existing which is the focus of the investigative stage of the paper.

These risks have a medium level of likeliness to occur since the main company that will be investigated has transparency with their processes and the necessary information to be disclosed do not represent any risk. This main risk can have a major impact of the result of the thesis since it can lead to a negative conclusion.

1.7 Key Concepts

To be able to comprehend the main topic of this thesis the main concepts to understand are the next ones.

Poultry: This refers to the type of birds that re domesticated and its main purpose its commercial since they are used primarily for their meat, eggs, and feathers. This includes most commonly chickens, turkeys, and ducks. This is a common practice in agriculture and one of the main protein sources for humans (Ensminger & Parker, 1986).

Heat Stress: It occurs when environmental temperatures rise beyond an animal's ability to regulate its body temperature. This condition can lead to reduced growth rates, lower productivity, and even increased mortality (Nawab & Ibtisham, 2018).

Poultry breeding process: Poultry breeding process involves selective breeding of birds with desired traits to produce offspring with improved productivity, such as higher egg or meat yield, disease resistance, and adaptability to environmental conditions. The process generally includes selection, mating, incubation, and hatching stages, followed by raising the young birds to a marketable or reproductive age (Hunton, 2006).

Management Practice: In agriculture management practices methods and strategies used to enhance productivity, and environmental sustainability. In poultry farming, management practices include feeding regimens, housing and ventilation control, health monitoring, biosecurity, and waste management, all designed to optimize bird growth and minimize risks like disease and stress. (Patterson & Wideman, 2008).

Livestock imports: Livestock imports refer to the process of bringing animals or animal products from other countries into a nation’s agricultural and food production system. This can include live animals, such as poultry, cattle, and pigs, as well as animal products like meat, eggs, and dairy. Livestock imports are regulated to maintain biosecurity and ensure food safety standards. (OECD/FAO, 2020).

2 Poultry Mortality Management

On the image below, the chosen themes that will be mainly investigated on this paper can be observed to have a clear perspective of which topics will be included and analyzed on the thesis. This with the objective of successfully narrow down main problems and possible solutions. These main areas were selected since they cover the most important factors that can affect the quality of life of chickens throughout all the breeding and processing part of the supply chain, since the main objective of the paper its to find root causes to the mortality rate increase in heat seasons this are the main areas of opportunity where answers can properly investigate.

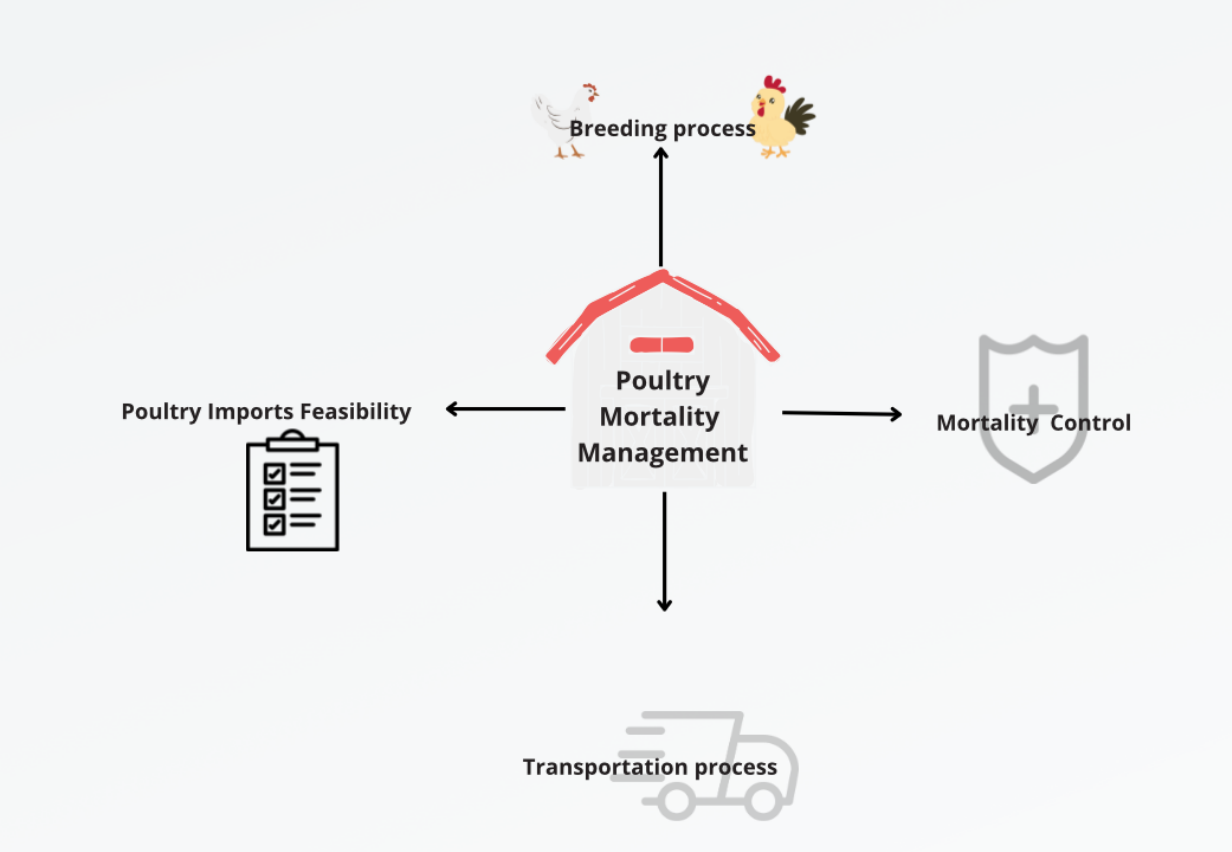

Figure 1. Theoretical framework (Author, 2024)

When thinking about successful breeding process, one cannot just think that the birds are just put on the ground for a certain amount of time and after sometimes they can be transformed into food, this process takes months and millions to ensure the health and quality of the animals, many risk factors are introduced throughout the growth process, this factors have to be identified and properly approached to successfully raise the chickens healthy and minimizing waste. On this paper key factors will be investigated with the purpose of finding the best possible alternatives of enhancements to currently used procedures to minimize waste and increase the life quality of the

animals throughout the breeding process, numerous factors must be considered withing the breeding farms, nutrition, a sterile environment, animal handling, etc.

2.1 Breeding Process & Mortality Control

This field will be the main topic of the paper since specific problems will be linked to this stage of the supply chain where poultry breeding companies fail to maintain a constant outcome and maintenance of quality. Throughout this topic effects of high temperature season on poultry breeding will be narrowed down so the writer can find specific risks to eliminate and investigate feasible solutions to reduce mortality during these seasons and provide metrics and processes to follow to reduce or eliminate this problem.

As shown in the figure below, mortality rates in poultry farms can get to even 50% when temperature are higher that 25°C, this can get to 70% when heat waves are over 33°C, this is a current problem that has to be investigates thoroughly to find feasible solutions to control this mortality rates, knowing that chickens specifically are extremely delicate to breed controlling temperatures it's a priority to reduce a min risk that poultry farms face specially when they are farmed in countries that have an average temperature over 20°C during the year (Grupo comunicación Agrinews, 2024).

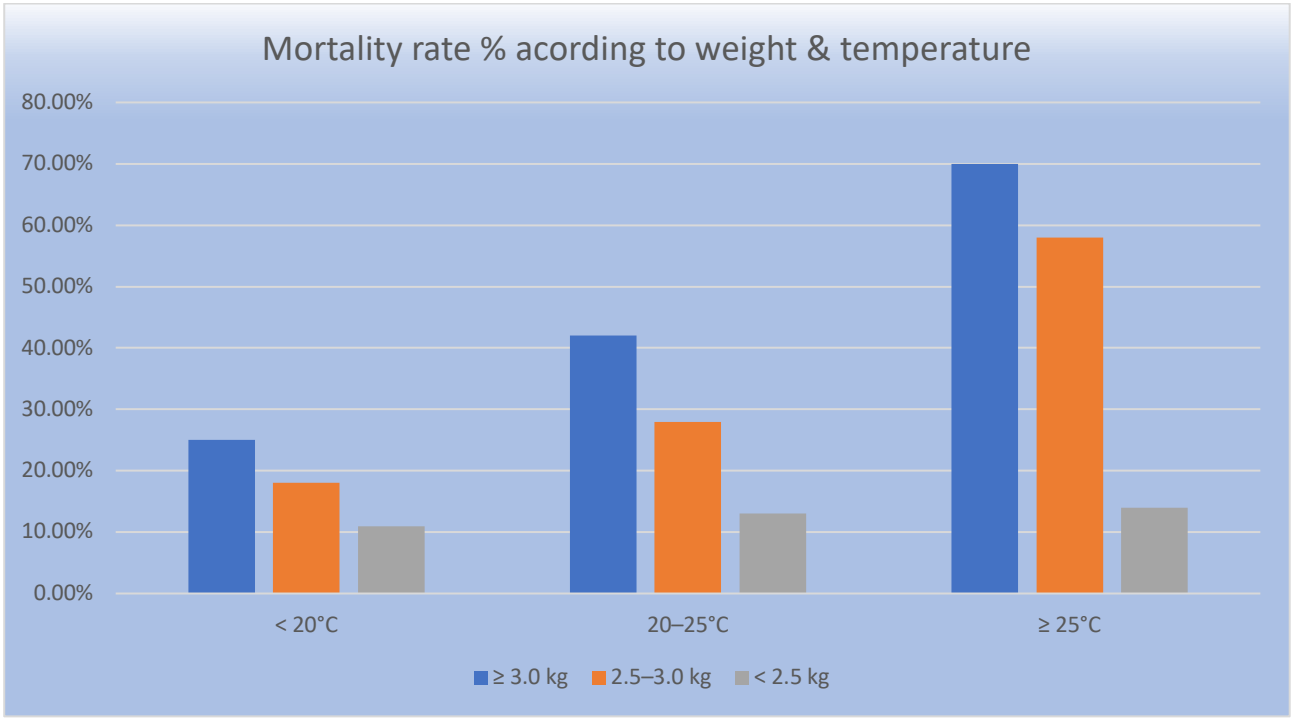

Figure 2. Relation between mortality rates and temperature. (Grupo comunicación Agrinews, 2024)

As the graphic above shows, there is a direct correlation between the weight of the chicken and the ideal temperature that its environment must have to maintain a constant and safe body temperature, it can be appreciated that as the body weight increases, the temperature becomes a higher threat to the specimen, as the temperature rises if not well managed, mortality rates will

exponentially increase, meaning losses for companies that invested time and resources into breeding and that will have to start over if the heat caused any sort of mental stress that could minimize the animal appetite and limit its growth or even getting into a point of extreme heat that death its inevitable. Heat stress is a real concern that poultry farms face, this problem can have a psychological effect on chickens critically reducing their productive potential, efficiency and significantly reducing profit margins to poultry breeding farms. As shown in the image below heat can be the main cause of numerous negative effects on chickens like oxidative stress, metabolic imbalances and suppressed immune responses, all these factors significantly increase the mortality rates in chicken breeding farms (Azad, M.A.K., 2020).

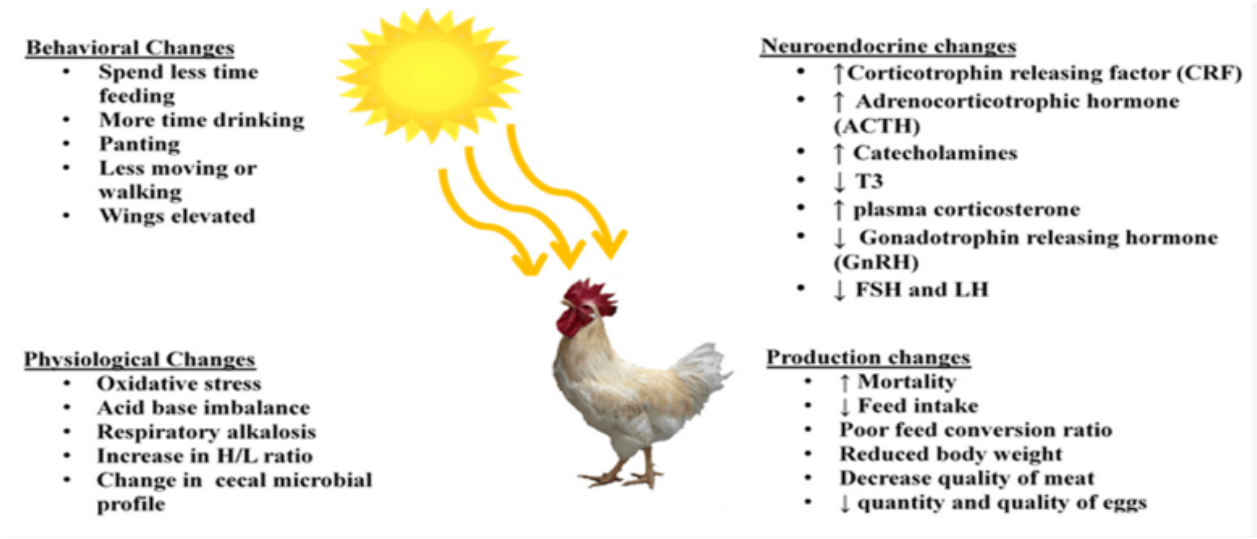

Figure 3. Heat stress effects on farmed chickens. (Azad, M.A.K., 2020).

An important factor that has to be taken into consideration is that global warming will be affecting the quality of life of animals worldwide, it is a problem that farms have faced for a few years now, as hot temperatures continue to increase in some countries, the mortality rates in their chicken farms has continue to raise since the current breeds of chickens that are used in the poultry industry are more susceptible to heat stress due to genetic differences that have appeared due to human interventions when domestication of various species started, many farm animals lost their capability of adapting to the changing environments, completely depending on humans to care and manage this changing environmental factors to completely take care of them, chickens being no different if prolonged exposures to a high temperature weather can suffer many consequences, develop illnesses, mental stress and in extreme cases death. It is no secret that both natural selection and the domestication of animals has changed basic characteristics of species to better fit the needs of human consumption, this has led to chickens not being able to properly adapt to the environment they are being farmed in which leads to the loss of populations and a more complex

farming process to ensure the success of the profitable life time of chickens through the supply chain (S.A., Schlecht, E. 2023).

2.2 Transportation Process

This investigation it's an imperative part of the paper, during this stage different suppliers in poultry leading countries will be considered and contacted to provide information on how feasible it will be to import poultry finished products to Mexico with the goal of having an external source of supply to regulate the market during shortage seasons so that it will remain stable preventing cost increases and supply shortages.

The transportation process from the breeding farms to the processing plant is a key step that can increase exponentially mortality rates due to the stress and that the chickens go through during this part of the supply chain, the conditions to which chickens are subjected to also play an important role in the success or failure of this part of the process. This link of the supply chain even through it's a necessary part, exposes the chickens to many risk factors that can be critical to successfully transport the birds to the processing plants. Transportation stress factors can affect the chicken welfare, psychological state and even the quality of the meat can be affected (Kettlewell, P.J. & Maxwell, M.H. 1992).

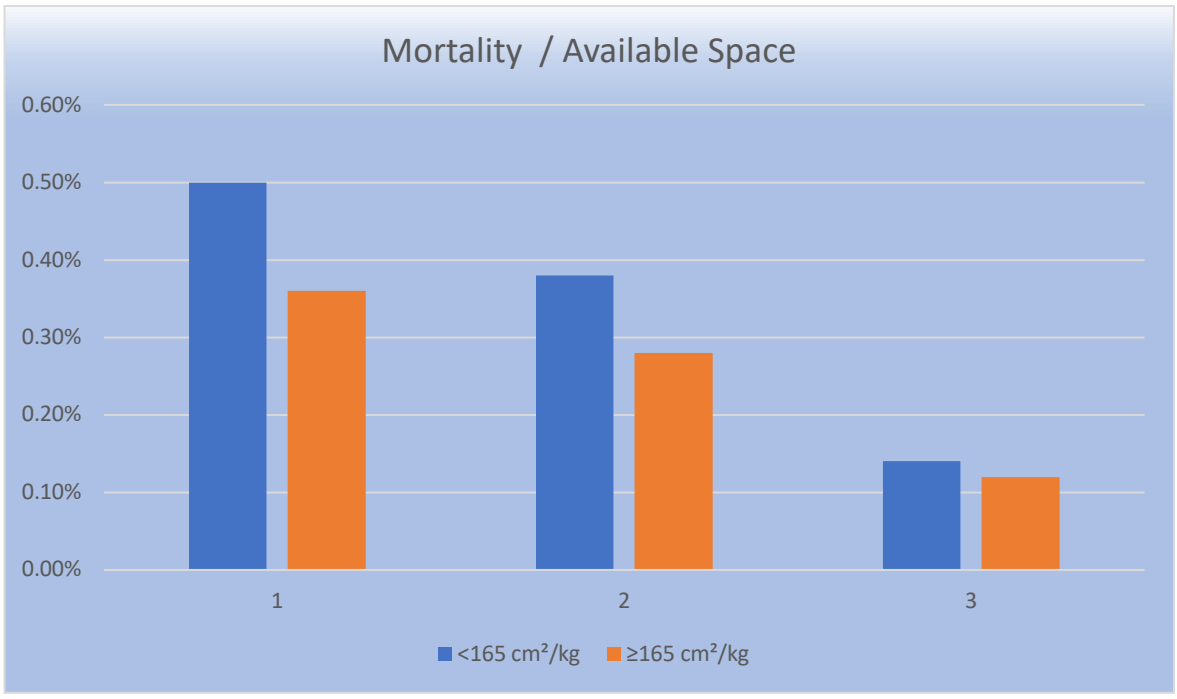

Figure 4. Relation between available space and mortality rates during transportation. (Grupo comunicacion Agrinews, 2024).

A very important factor to take into consideration as shown in the graphic below is the overcrowded transportation conditions to which chickens are put through, the mortality rates can increase

significantly depending of the weight and the amount of provided space, during this period of time even though it does not consume a lot of time it represents a high risk, under this overcrowded environment chickens are subjected to physical and phycological discomfort, having to fit in small cages, limiting their ability to move or spared their wings and having to share small spaces to increase the number of chickens that can be transported in just one trip, this increments their body temperature and when combining this factors with high weather temperatures the number of living chickens decreases, incrementing losses and possible contamination which can disqualify entire batches from production. (Kettlewell, P.J. & Maxwell, M.H. 1992).

The miss handling of the birds during loading and unloading process it's also an activity that represents a considerable risk, rough handling in this part of the transportation process can lead to many inconveniences like broken bones, bruising that cause the chickens pain and stress which can lead either to infections, lower the quality of the meat, infections or enabling the chicken to be processed due to sanitary regulations. All these human mistakes can be taken care of to significantly reduce the stress for the birds to help improve this link of the supply chain to ensure that the chickens have the ideal conditions to be correctly processed and then sold to the end customer providing high quality products and reducing company losses (A.J. & Mahlako, K.T. 2015).

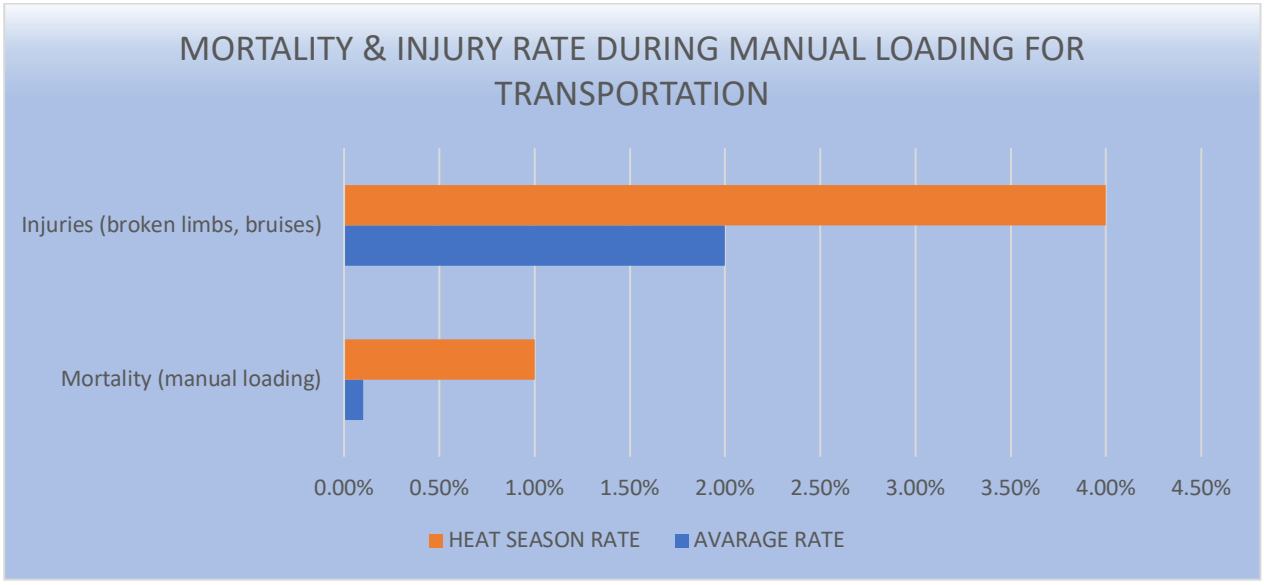

Figure 5. Mortality & Injury Rates during manual loading for transportation (Author, 2025).

As it can be appreciated in the graphic above, manual transportation represents a significant risk, being such a harmful process that represents a considerable risk, it must be thoroughly analysed to properly delegate any possible alternatives that will reduce the stress produce by manual handling of the chickens in other to load them into the transportation trucks (Gentle, M. J., Hughes, 2011).

As the graphic shows, the injuries like broken limbs and bruises increase exponentially when there is a high weather temperature, this happens because loading times have to be reduces to make the transportation time as short as possible, this with the intention of not having the chickens for prolonged periods of time inside the truck which can produce high amounts if stress and since temperature is high the amount of chickens that will be transported has to be reduced this means that more trips will have to be made which is also one of the reasons this part of the process gets rushed, but when this process it's made by hand it increases the stress for the animal and makes damages and even causes dead, as its shown in Figure 5, mortality rates also increment when loading the chickens by hand meaning that if 10,000 chickens will be transported just by loading them by hand 50 chickens as a minimum will not arrive alive to the slaughterhouse to be processed meaning losses for companies that do not have the proper equipment to effectively handle the animals (Herbert, R, 2013).

2.3 Poultry Imports

This investigation it's an imperative part of the paper, during this stage different suppliers in poultry leading countries will be considered and contacted to provide information on how feasible it will be to import poultry finished products to Mexico with the goal of having an external source of supply to regulate the market during shortage seasons so that it will remain stable preventing cost increases and supply shortages. This will have the focus of having the best possible alternatives to have as many plausible solutions as possible, having an external source can be the best option thinking that the possible solutions to control temperature in farms and control stress though out the transportation part of the process becomes to complex or means a higher cost.

To consider this solution many factors must be analyzed to ensure that a new brand of chicken products would succeed in Mexican markets, cost and quality of the meat would have to be at least on the existing standards for distributors to consider it as a good alternative for the shortages caused due to high temperatures in Mexico. As figure five shows, the main poultry production companies in all the American continent can be seen ranked, this would be the possible main partners that would be selected to propose this alternative, currently the main partners that would be selected are the companies based in Brazil and U.S.A, these two countries are leaders in this industry having the most competitive products in quality & cost.

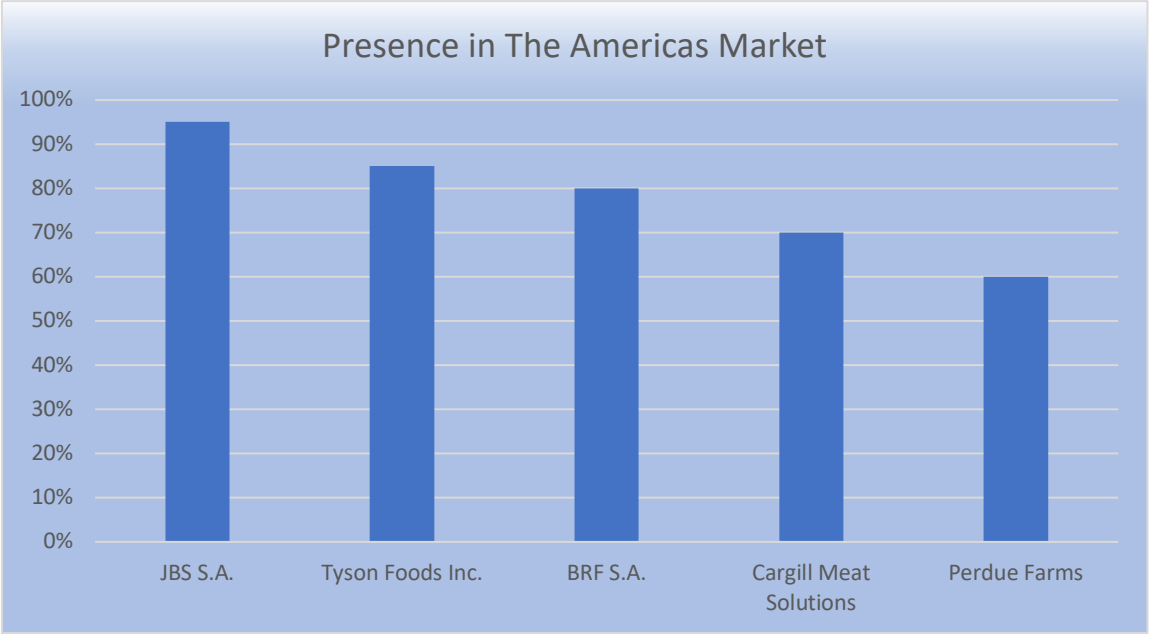

Figure 6. Main poultry companies in the American Market. (Matplotlib,2025).

This companies even though they are the biggest that currently exist in the Americas not all of them will be suitable for a partnership, having a specific example of JBS S.A. even though this company currently occupies the number first place of this rank its already has presence in Mexico and in the U.S.A since a company sponsored by them its Pilgrims, this company currently is one of the companies with the most presence in Mexico and in the U.S.A. this could complicate business deal since it would mean making competition against their own already existing brand.

Even if collaboration with this companies its possible, many factors would have to be taken into consideration to narrow down the best possible partner (FAO, 2023).

Key characteristics to take into consideration would include factors like product quality this focusing on keeping high standards regarding meet safety and all nutritional requirements and the necessary certifications to ensure that the chosen company follows the necessary regulations. Supply chain reliability it's a key factor specially since the main goal is to find a reliable source to be able to successfully supply the Mexican market during heat seasons without having the same shortage problem. Cost effectiveness, this will be one of the main determents for the success of this partnership, having a good quality product its important but also having competitive pricing to be able to brake in the Mexican market as a competitive solution, since importation fees can make the products more expensive due to tariffs it's imperative to have an adequate plan to either lower this importation tariffs or that the products has many benefits to be a worthy option(EUFIC, 2024).

The main reason why smaller companies are not being considered for this paper it's that reputation and market presence are important to ensure the succeed of this contingency plan, if the brands name isn't known for good characteristics like quality, reliability, etc. consumers won't be open to this higher risk. Companies must also have a solid financial stability to be able to take charge in a

big project like this, expanding market boarders it’s a very important and risky step and financial stability it’s a must when thinking on expanding (World bank, 2023).

Many factors will have to be taken into consideration to accurately find a suitable business partner that could fulfill the Mexican market needs, even though the size of the company and its market presence are factors that have big influences when opening international markets, variables like price, quality, if the product its compatible to what the market is use to, transportation arrangements and even the type of products that could be eligible for a long distance shipment

3 Research Methods

The approach that will be taken for this surveys and interviews will be qualitative and quantitative. This information will be gathered by doing face to face interviews with the logistics area from the main poultry suppliers in México and with the veterinary department of poultry breeding farms, this with the objective of fully understanding the main problems to properly narrow down the investigation and achieve the best possible alternatives to reduce mortality rates, knowing what causes them and what can be improved to reduce this numbers and stabilize the market supply. Also, survey will be given to various poultry distributors in the state of Queretaro to measure the gravity of product shortages and the openness to purchase poultry finished products from foreign countries. The Surveys will have to be delivered by printed sheets due to the target audience and the general data will be then analyzed and digitalized. The main risk to this section will be the openness to disclose delicate information of the companies. The chosen interviewees have been selected from the main poultry processing producers in Mexico, this with the objective of having a withe context on how severe this problem is, what current procedures are been taken into action to reduce the current waste and which parts can be improved to reduce mortality rates that cause the supply reduction in the market

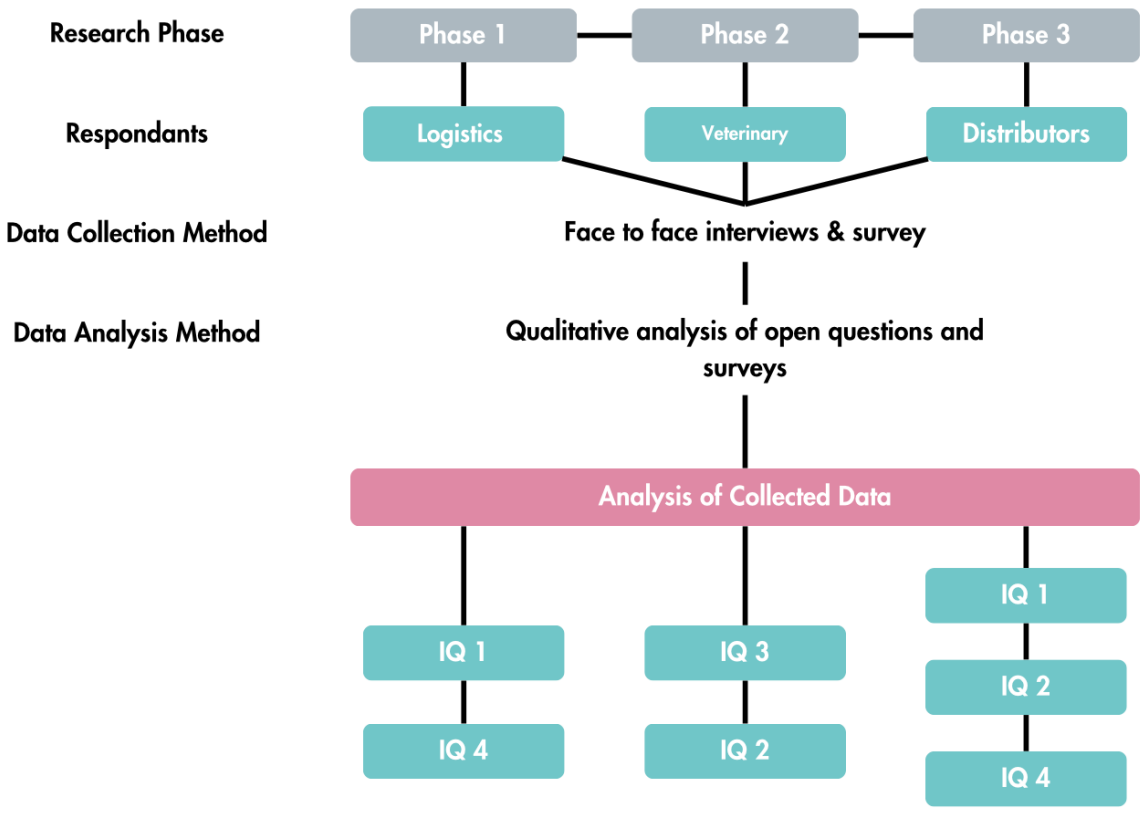

Figure 7. Research Methods Mapping (Author, 2024)

3.1 Research Design

Throughout this paper different methods will be used, applying qualitative and quantitative data collected from three separate focused groups, the logistics department of a chicken meat production companies will be interviewed to assess the main risks to see through, this with the intent of fully understanding the main root causes of the increasing mortality rates interviewing different members from the logistics team of the main chicken meat distributors in Mexico, the next sector to interview will be focused on the veterinarian department of the farms where chickens are grown until they are ready for production, this with the objective of properly assessing if there's prevention plans or any sort of existing procedure that can be followed in order for this incidents not to occur in high percentages, each of the companies mentioned before has their growing farms throughout Mexico, the goal is to interview the head of the department of each companies and their crew members as well. An important point of view that must be taken into consideration is the perspective of the stakeholders, regarding this high mortality rates that happen in the breeding process in chicken breeding farms, main poultry distributors will answer surveys to fully understand their perspective and how much does this affect the market yearly during heat season.
This phase will gather enough information to deeply understand the gravity of the shortages, its effects, the level of competence and areas where chicken production companies have to improve or take into account to accurately assess this phenomenon and explore possible solutions or alternatives to control the bottleneck in the supply chain of chicken finished products that occurs in seasons in which temperatures are higher that 25°C which for countries like Mexico that high temperatures are constant throughout the year.

3.2 Data Collection

Face to face interviews will represent an important amount of the collected data that will be used for this paper, interviews will stablish the severity of the studied phenomenon in the poultry sector, the expected data that this interviews are expected to provide is qualitative data meaning that exact numbers and precise information will be gendered, since the solicited information will focus on weak process links and errors in the supply chain the risk of sensitive information not being fully disclosed is possible but the risk is minimum which its why it's not considered a threat to the data that will be collected throughout the interviews.
Surveys will be a key tool to utilize in this thesis since the surveys will provide the writer real life cases on how shortages do can affect the existing market and how much damage this high mortality rates can produce to the stakeholders of chicken production companies. The data collected

throughout the surveys will be qualitative, meaning that the collected data will show stakeholders perspective on the problem that its being investigated by the writer, the stakeholder's point of view on how much a market stabilizer factor its needed and how long it currently takes the market to stabilize after a shortage happens.

After conducting the planned interviews and surveys to the writer will also investigate existing relevant papers that can contribute to this investigation to better comprehend the different approaches that other companies have taken to reduce mortality rates or to control temperature in their existing farms, this will lead to a deep investigation in farming techniques, temperature control in breeding farms and stress control in livestock during transportation. These topics will help to find suitable solutions to have viable options to correctly comprehend how to reduce the mortality rates though heave heat seasons.

3.3 Data analysis and interpretation

To process the collected information in the best possible way various methods will be used, merging the existing information collected from the surveys and the interviews, this will give a proper perspective in how to target the main discovered problem to have a better comprehension in possible solutions, this will allow the writer to lean the investigation process into the most suitable solutions.

To address the quantitative findings in the best possible way tools like excel will be used to order all the collected data to successfully stablish a median where variables like temperature, location and transportation times can be measured to recognize a pattern in areas of opportunity to stablish weak links where changes can be done. Inferential analysis will also be a used tool, this with the objective of stablishing two or more studied cases where this problem has also been studied and make comparisons between these groups and be able to state a relationship between all these variables like temperature changes and the impact that they cause in poultry supply stability (Bazeley, P. 2013).

Regarding the qualitative part of the investigation, the main analysis will be done to be able to recognize patterns and identify main topics to narrow down and interpret the results with the objective of giving a quantitative value to the collected results, making the qualitative results quantifiable it's an important step to take to accurately find the hey problems and attempt to find the best suitable solutions (Bryman, A. 2016).

4 Findings

In this section the collected data will be shown and an interpretation of it will be performed, narrowing down main topics, problems and findings no accumulate enough data to properly asses if the problem that is being investigated can actually represent a threat to the Mexican poultry market and if so, complementing the collected data with investigations an quantitative information to successfully understand if the problem requires a thorough re-organization of the breeding process that's currently being used in poultry farms or if the existing processes are just in the need of adjustment or to be complemented to ensure the best possible process of the available information and focus on the main topics to come up with real alternatives that can be applicable in the real world.

The interviews as it was expected gave inside information to properly focus this paper on what is happening with the chicken market, some previous assumptions have been corrected and modified due to the new information that was collected during the interviews, meaning that some of the information already collected will change since a proper perspective of what should be the target of the investigation has been complemented by professionals with real life experience. It must be noted that some interviewees have requested for the results if publish, to be completely anonymous due to the sensitivity of the given information.

As it was previously mentioned on the paper, the focus group for this investigation are stakeholders, meaning the main chicken product distributors from the state of Querétaro, Face to face interviews with the head of the veterinary department from a chicken breeding farm and a member of the logistics team from a chicken production plant in Querétaro, México. These interviews were carefully chosen to have the best available information.

4.1 Main Problems for Chicken product distributors caused by shortages

Stakeholders represent some of the most important sectors of the existing market since they are who are the most interested in the wellbeing of the stability of the supply and demand, this with the purpose of benefiting from a stable market, that will always act mor in favor that one with many ups and downs on the supply which will lead to dangerous price fluctuations risking quality, increasing unhealthy market competition and reducing significantly the return on investment that some stakeholder sectors like chicken product distributors will suffer. On the picture below well explain the perspective of the main chicken meat distributors un the state of Queretaro, their perspective of the main problems an on how these factors affect their businesses.

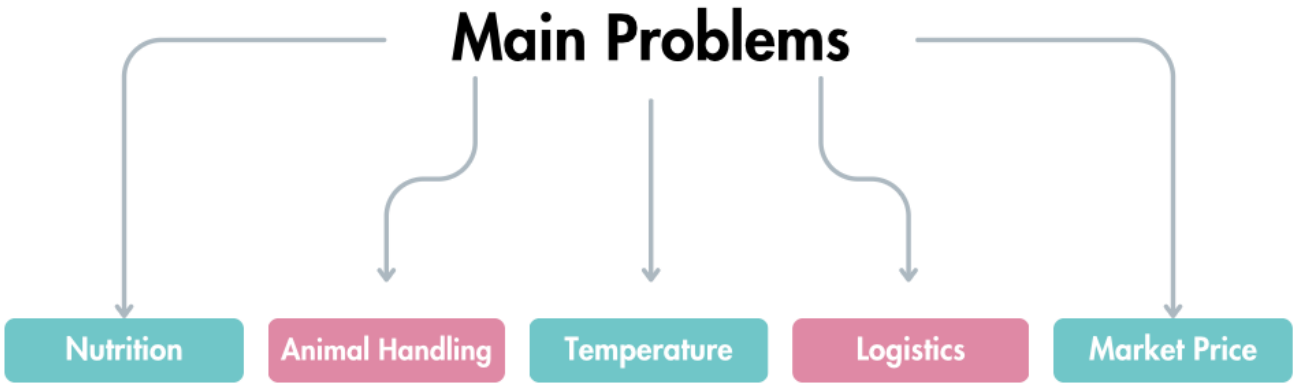

Figure 8. Main Problems (Author, 2025).

As it is shown in the graphic the main concern for distributors arrives when the highest temperature seasons hit the country, this does not only affect the supply of the market but also affects significantly the product distributors, according to stakeholders when shortages occur, there is a noticeable quality decrease on the meat which can be directly related to the lack of food consumption that chickens have caused by the stress for the heat of the environment, making chicken´s appetite to be almost non-existent decreasing the weight and making way harder a proper production since the chicken the amount of meat collected will be less and for the customers that sell the chicken complete off without a major process, just the chicken´s different parts this will mean that the quantity that will be needed to be sold has to be higher since weight per chicken per kilogram is lower but the price per kilogram is higher so the return on investment of a load of chicken sold will be the same of even lower, which is not good for distribution companies since they operation costs become higher due to the volume that has to be purchased, stored and distributed will be more than usual and the earned money will not have the same price as it is shown on the image below.

Table 9. Price/Weight comparison during heat season (Author, 2025).

	Boxes	Kg per Box	Total Weight (kg)	Price per kg (MXN)	Total Price (MXN)
Standard Weight	400	27	10,800	53	$572,400.00
Shortage Weight	400	25	10,000	70	$700,000.00

As it is shown on table 9, during shortages chicken meat prices skyrocket, creating are rough competition within the market, the standard price of the chicken meat per kilogram raises an 18% when it reaches pic pricing, even though that's not the highest price that chicken meat gets to during shortages it is the most common prices range that chicken gets sold at during these period, as it

can be appreciated on table 9, it is more expensive to purchase, stock and sell the exact same amount of boxes per trailer but the biggest challenge arrives when you are receiving a significant less amount of product but still pay an 18% more as if you were receiving the standard amount, this is the reason many distributors if they do not prepare properly for heat seasons, they risk the loss of important customers, loss of income and even go to the extreme of bankruptcy because of the high costs and the low amount of available product.
On the image below we can appreciate the difference in price range that chicken meat has depending on the stability of the market.

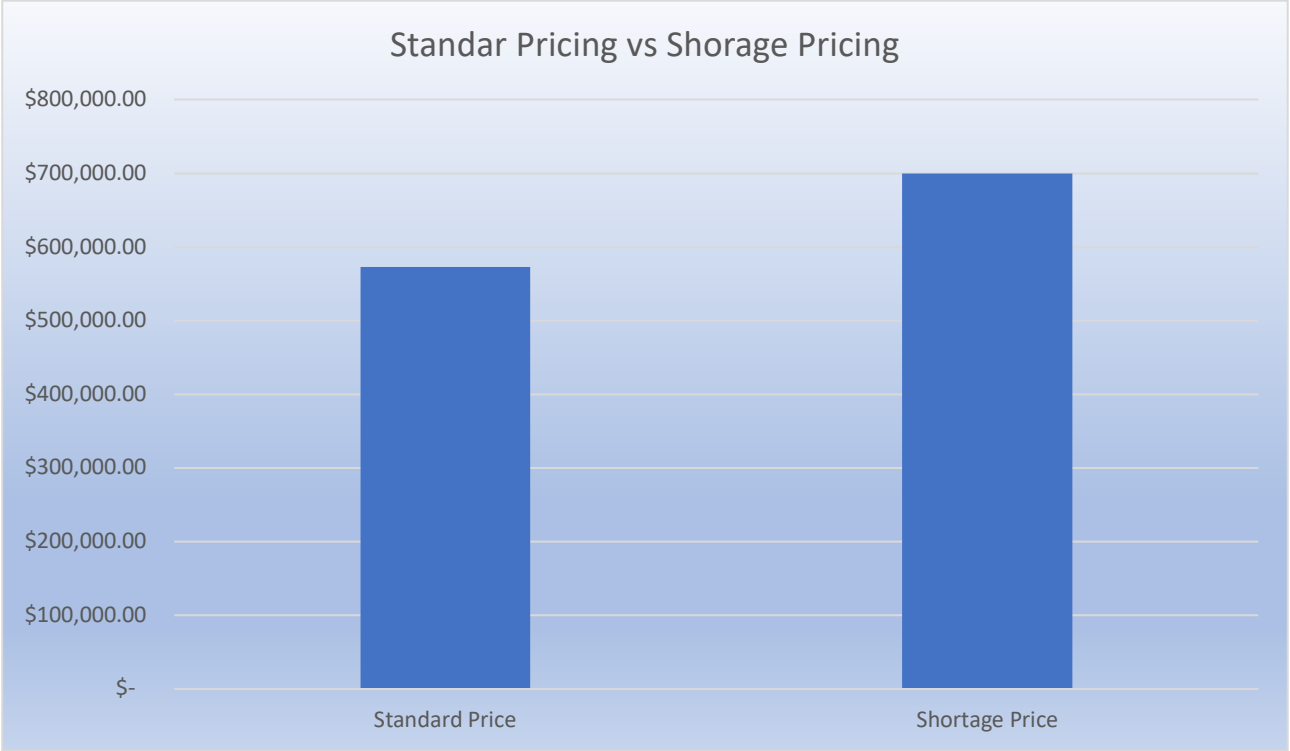

Figure 10. Standard pricing vs Shortage Pricing (Author, 2025).

On figure 10 we can see a representation of the equation shown in table 9, here it is easier to properly appreciate the difference between periods, we have to remember that on this example, the amount of revived goods are the exact same in weight but as it is shown in the graphic #3 the price its significantly higher but what represents the real threat for customers, distributors and stakeholders overall is that the amount will be lower as well as the quality of the products because since there is not enough supply to properly fulfil the market needs, quality standards must be lowered in order to take advantage of as much available meat that is being processed so the market won't be as affected as it could if all quality measures were strictly being taken into account.

4.2 Veterinary challenges and approach

This section of the paper may be the one that will have the most influence in the end conclusion of this investigation since these department is in charge of the main challenge that is being investigated by the writer, the veterinary department is in charge of ensuring the well-being of the birds from the moment they arrive to the farm until the moment they have to be transported to the plant to be processed and turned into finished goods and high quality chicken meat .

A main fact pointed out by the interviewee is the fact that high temperatures can only affect the birds depending on the geographical position and the weight of the animal, as chickens grow temperature must be decreasing, meaning that when chickens freshly arrive to the farms to be raised they must be maintained at a constant temperature between 30°C – 32°C, if the temperature is lower than 30°C the birds can die since they do not have the necessary weight and fat to keep an optimal body temperature.

After the arrival of the chickens temperature must start decreasing 2°C every 2 weeks to ensure a proper growth and to successfully have healthy prospects until they achieve the required weight for the type of product they will be used for, the biggest standard size in the Mexican market is 2.5kg – 3.0 kg, when chickens get to this body weight the temperature in the farms must be maintained at 19°C – 20°C, for temperature to represent a risk heat must rise over 30°C to be a threat to the birds, knowing that when talking about chicken products many different ranks are used for the meat distribution when the meat will be sold to the end customer without any major process, just the whole chicken to be cut in deferent parts and consumed, this categories generally have half a kilogram to a hole kilogram in between to properly separate the size of the end product to accommodate the consumer and their necessities.

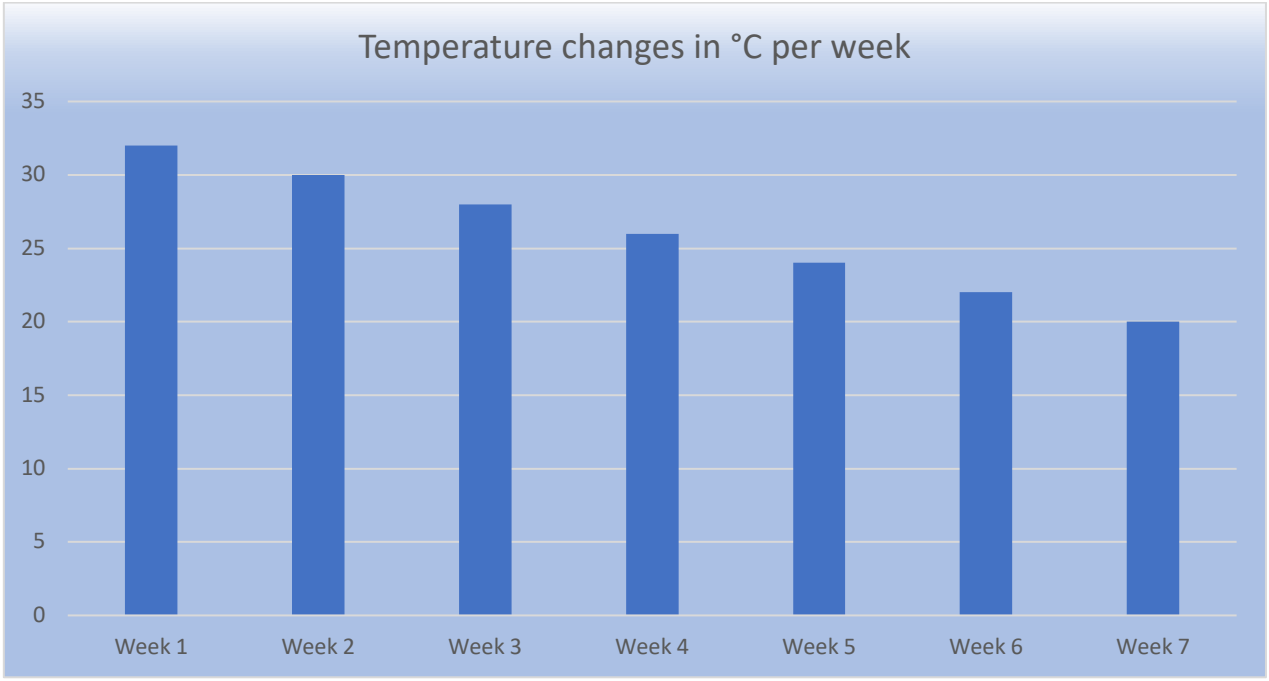

Figure 11. Temperature changes in C° per Week (Author, 2025)

In Mexican states that are in a more centered position the problem of high mortality rates due to heat is low depending on the month of the year, during months like May and April the veterinary department has to ensure that withing the installations temperature will not go over 30°C this to minimize the risk of endangering the chickens, causing them to experience stress due to the heat, if temperature is between 30°C – 34°C this will cause stress to the animals but if temperature raises over 35°C mortality rates will drastically increase. Since the first and main consequence of this stress is the loss of appetite to the animal, risking their growth, when this happens it's when the market starts suffering since farms are unable to grow them until a proper weight to successfully fulfill the market needs, causing the chickens to have to be transported as fast as possible to the processing plant to lower the risk of diseases of the death of the animal, leading to big monetary losses due to all the investment that has to be done just to bring the young chickens to the farms and to help the grow though out all those weeks to have as much product as possible. As it is mentioned earlier, this risk will only affect in certain months in states like Querétaro but since breeding farms are positioned throughout all the country's states it must also be included, as mentioned by the interviewee, states like Chiapas have high risk of disease and mortality rates since their standard temperature throughout the year is high. Proper infrastructure must be included on the design of the farms to properly accommodate the changing temperatures from the exterior and maintain the adequate temperature withing the farm so that chickens depending on the stage of weight where they are temperature will be constant and accommodating for their growth. The main areas were pointed out by the interviewee, this are the main areas that must be taken care of to successfully breed the chickens from a young age until they reach the weight and maturity to be moved to the processing plant. These main areas will be explained with the interviewees insights and explained with as much detail as possible under the next image.

Figure 12. Main Topics (Author, 2025)

Animal handling is the first step to properly accommodate chickens in the farms, the proper cares must be made for the stress of the transportation and de adaptation of the new environment to not mean a decrease in the animal's appetite or mental health. Within the chicken coops comfort must be a priority, since a large number of chickens will be kept in the same place many factors must be completely under control to eliminate all risks and failure bridges that may occur, the chicken coops must be completely sealed from the outside world, not properly handling this will mean that outside animals can access the facilities endangering the chickens, animals like rodents and outside birds can create an stressful environment for the animal and also carry various diseases that could possibly contaminate all the birds, this leading to a contagious pandemic withing the farm, forcing the mas sacrifice of all the chickens with the objective of containing the disease and preventing it from spreading to other chicken coops, farms or even affecting the end consumer.

When safety is a priority and a sterile zone is the main objective, farms must not only be protected from other animals but also from humas, special clothing must be given to employees that are in constant contact with the chickens and before entering each area a sterilization bath must be taken pro properly ensure that no outside viruses or germs will enter the different areas of the farms.

Thinking that the chicken coops is where these animals will spend all they´re live, this means that it

must be a safe place to ensure a healthy and controlled growth to ensure the companies quality standards since chickens cannot arrive with diseases of even death because this will immediately disqualify them to be processed.

Disease prevention scheme, this will ensure the throughout the chicken´s life, not viruses or diseases will be transmitted, and for this stage to properly be taken care of, the veterinary department of that farm must have each and every one of the chickens has to be properly vaccines with all the vaccines stated by the government in the animals health federal law, in this book all priority cares will be listed for farms to know what are the minimum specific types of vaccines, medication and food must be given to the chickens to have a health standard, according to the interviewee the main challenge in this area arrives when handling the bird flu, when this happens the government has to give an special permission to breeding farms as to when can they start using the proper medications and which types of medications are permitted to be used, since this process can take some time many birding farms will try to find the best, fastest and cheapest solution which in many cases means sacrificing all the birds and doing a process that is known as Sanitary Arc, what happens with when this process is activates is that farms will empty all infected chicken coops from the farm and in some cases as a preventive solution the whole farms will get empty and will be placed in quarantine for a period of 15 to 16 days, during this time no chickens will be in the farm, every place will be carefully disinfected and sanitize for the new batch of chickens to arrive and do not have the risk of any of the past chickens diseases to be a safety concern.

Nutrition must be a priority for farms to have healthy specimens growing, many areas have to work together to ensure that this area of the animals life its being well taken care of, veterinarians, engineers and even chemists, all this different areas are in charge of creating the best possible diet that will help the chickens gain the most possible weight safely in the average of two months that they will stay in the farms. This diet must be carefully planned since the amount of food and nutrients that each chicken will need will depend on the weight of the chickens that are separated according to this numbers to properly fit the different process that they will be put through on the processing plant.

4.3 Logistic Challenges

The focus of the logistics part of the paper will be to find the highest risks to consider when moving the chickens from the breeding farms to the slaughterhouse, this is a delicate process due to all the steps that involve moving large amounts of animals throughout long distances as it can be appreciated on the image below the main risks and their consequences are shown and how corelated they are from one another, but knowing the severity of this risk factors mixed with the temperature variable leads this specific part of the process to be a cornerstone for the success of this process, from the moment the chickens arrive to the breeding farms until the moment they are transported to the

slaughterhouse, this step has to ensure that the transportation does not risk more the lives or healed of the birds to ensure that waste will be brought down to a minimum and for all the available meant to be properly processed to achieve its purpose and not having to be thrown out.

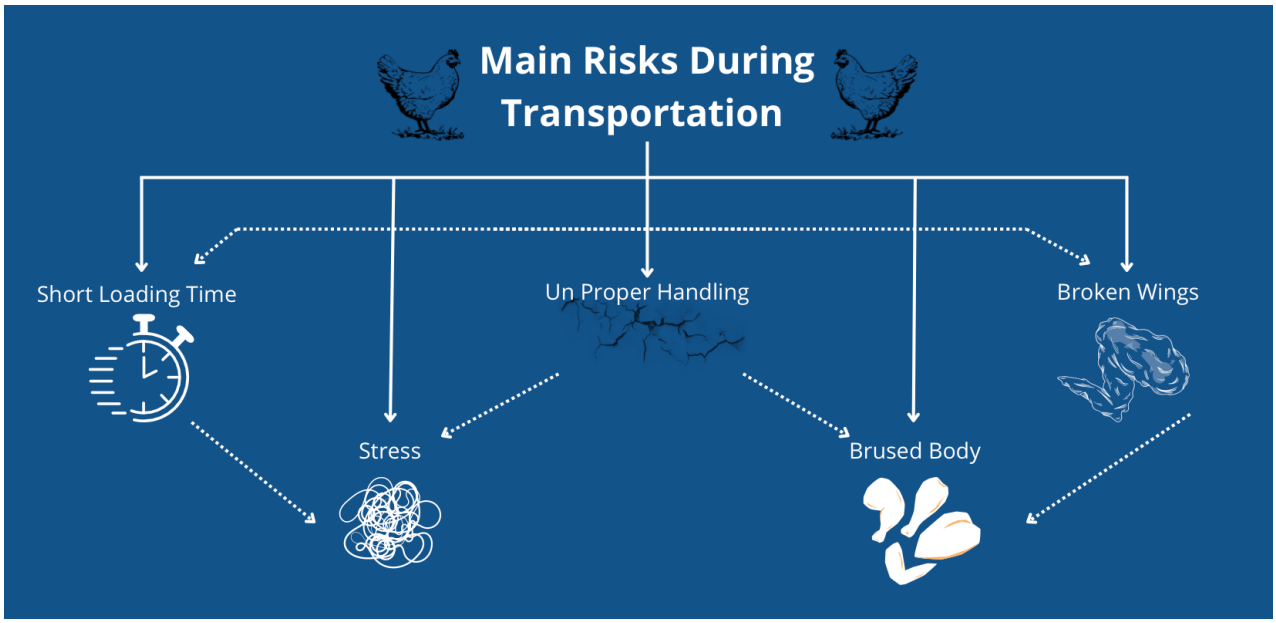

Figure 13. Main Risks During Transportation (Author, 2025)

After chickens have been successfully bred on chicken farms, a last step of the chain must be successfully made to properly take the chickens in the best possible conditions to be processed. During this process workers must grab the chickens by hand, the method that its most commonly known in Mexico to achieve this is hand picking the birds, they must grab them from their legs, this is an stressful moment since the truck must me fully loaded as fast as possible to reduce the loading time as much as possible, chickens get grabbed, being carried 8 at a time, 4 in each hand, this process due to the lack of specific training and the high amount of pressure that it's given to the employees of the farm to load them at a fast pace results in chickens being unnecessary damaged, after being hand-picked the chickens are thrown into cages and then the cages get loaded into the truck.

An average of a hundred and twenty thousand chickens are processed daily when the proper conditions are met, this is the reason for the fast pace that must be taken from the farm workers to send as much loaded trucks as possible to the processing plants. When chickens arrive to the slaughterhouse the same process is used to un load the trucks and to take the chickens out of the cages so that the transportation truck can go back to the farm to transport another load of chickens, at the arrival moment to the plant, chickens are stored on a segment of the facility that had costumed ventilation to regulate the chickens temperature and all the stress and heat produced by the transportation process that was made, being under stress and some of the chickens injured

with broken limbs and burses on their body they will have to be selected depending of the stress levels and the amount of damage received to accurately being designated to the area where their meat will the most useful.

Standard Amount of Proccessed chickens daily	120000
Amount of Processed chickens during Heat Seasons	80000

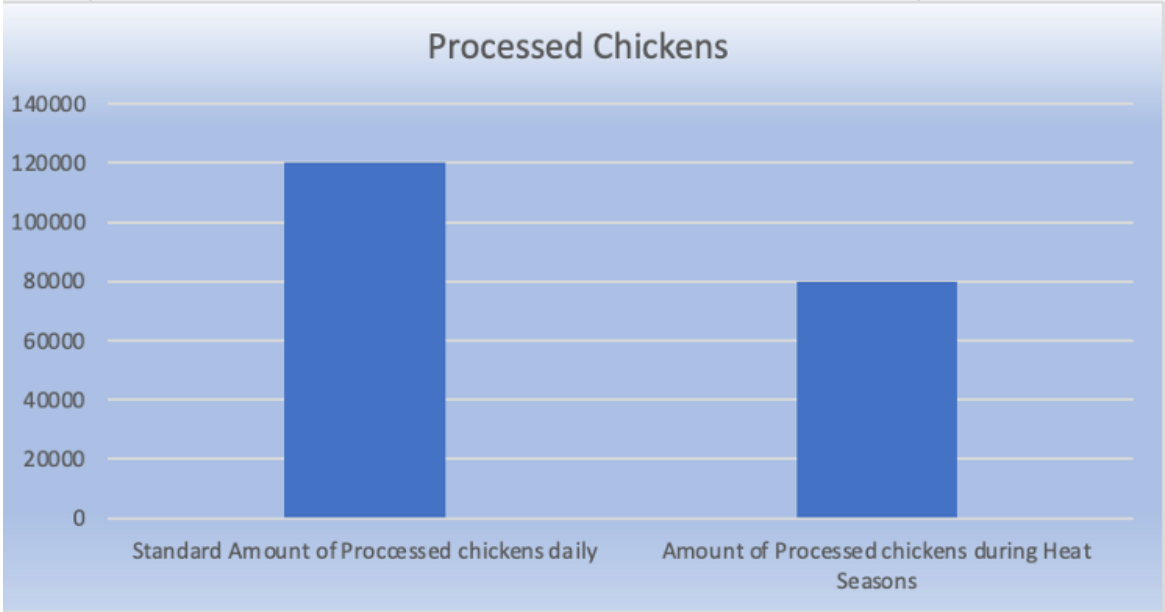

Figure 14. Average processed chickens per day (Author, 2025)

As it can be appreciated on Figure 13, the number of processed chickens per day drastically decreases when high temperatures must be considered, this happens because since temperatures start increasing, the body temperature of each animal increases too and when this factors also must be combined with transportation and loading stress, it becomes a risk factor that can possibly lead to higher mortality rates or even just lower meat quality. This risk can be approached by reducing loading times but as it has been shown, shorter loading times will only lead to damaging the chickens causing them unnecessary stress and damage.

The most common practice that will be done its keeping low loading times but the transportation process will be made at night, doing this transportation when the sun its down give the logistics team a really good advantage to safely move the cargo from farms to the slaughterhouse drastically reducing the temperature factor, ensuring the chickens have the lowest possible stress, to create a more manageable environment the amount of transported chickens will also be reduces, this will mean that less birds will have to be cached and moved into the transportation trucks which means a faster transportations and more space in the transportation cages, giving chickens more space to move, have a better ventilation and be in the best possible conditions to arrive safely to the processing plant, by reducing the total processed chickens per day to only a 66.67% of the

total capacity per day, customer demands cannot be fulfilled, increasing drastically prices of all chicken products but it secures a minimum but constant supply that will be more efficient than if companies tried to process at full capacity without acknowledgment of variants like the weather. This number of processed chickens per day could increase by taking into consideration other factors, since the mortality rate of chickens during transportations its an existing problem as it is shown in the image below.

Standard Mortality Rate	3%
Mortality During Heat Season	5%

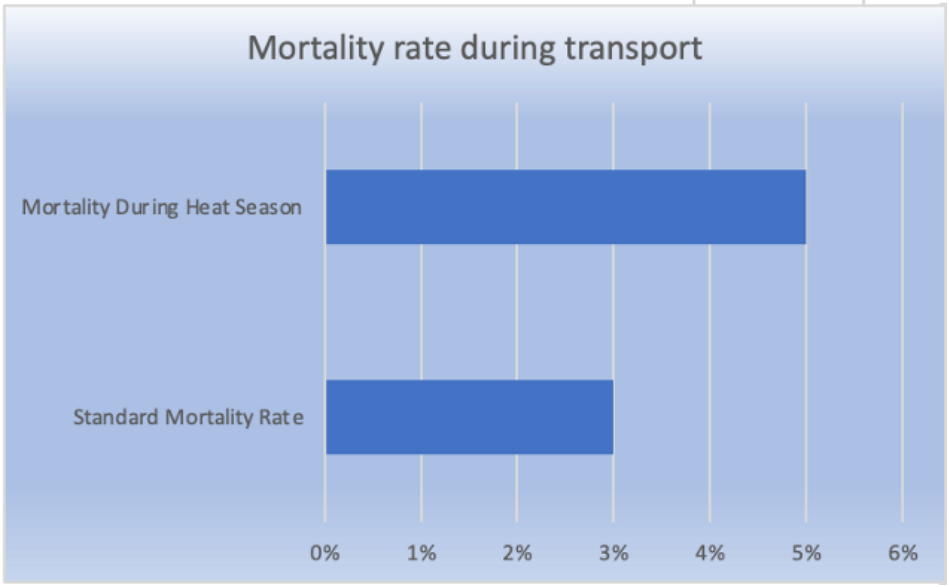

Figure 15. Mortality rate during transportation (Author, 2025)

As mortality prevention and reduction is the main focus of this paper, a subject that has to be thoroughly analyzed is the amount of chicken that suffers death before arriving to the processing plants, this phenomenon as it was previously shown has a direct correlation with the current practices used by logistics and farming personnel when not using special equipment of training to hand pick each chicken and safely putting them into the caged that will then be loaded into the transportation trucks, due to this inefficient practice an average of 3,600 chickens die before the arrival to properly be processed, meaning that they will be completely ineligible and become waste, this number does not include the damaged chickens that will also be disqualified depending on the severity of their damages and having the best possible weather conditions that do not complicate more the travel from the farms to the slaughterhouse.

Thinking that temperature during the transportation is over 27°C and that the chickens that are being transported to be processed have an average weight of 2.50 kg – 3.20kg, when taking into consideration this temperature, accumulated stress from loading and un loading, fiscal damage from unproper handling and that due to the weight of each chicken the ideal temperature would be

under 24°C, mortality rates will increase a minimum of 2% during the transportation, this would meant a total of six thousandth chickens won't make it to the slaughter house, that's a loss of an average of 17,700 kg of chicken meat per day that won´t be eligible for consumption and that will be wasted, this without taking into account the chickens that were damaged and that will also not be eligible to be processed.

Having to consider the import of chicken meat to Mexico as a possible solution to shortages, this with the purpose of stabilizing the market needs and lowering the bullwhip effect that the market suffers during heat seasons, ensuring a constant price per kilogram during the year will not fluctuate as much, interviewees exposed that this can be done with frozen finished products, this is a methods currently used depending on the demographic sectors that distributors are located on but the highest demand in Mexico its chicken meat without being processed into a more specific item, meaning that majority of households in Mexico often prefer to purchase the whole chicken.

This being the case the purchase of specific products like chicken tenders, nuggets, etc., wouldn't be a feasible option to take into consideration knowing that the best seller chicken product in Mexico it's the whole chicken and the transportation of this product would have to be frozen, making it a challenge to successfully transport it to Mexico without inflating the price too much making it not a feasible option when trying to enter to the Mexican market as a foreign and more expensive product.

5 Conclusions

The focus of this chapter will be identifying key ideas found during the investigation process, all relevant information gendered has been analyses and sorted to have a more efficient problem solving, this is made with the intent that of not focusing on problems which solutions will make small unrecognizable improvement but to focus on the biggest found bottlenecks that can create a positive impact on efficiency and product utilization inside chicken processing plants.
The main obtained results will be analyses to have a clear idea of what alternatives can be used, also which of the assumptions taken from the beginning of the investigation qualify to properly give feasible solutions and alternatives to improve the existing procedures that are lacking in certain areas of opportunity that if properly exploited that reduce considerably waste, increase company´s revenue and create an overall more stable market with enough supply all year round that a the reduction of the bullwhip effect on prices will be reduced considerably arrive to a more standardized price for chicken meat and its derivative products.
Considering all the current procedures and techniques that are being used in slaughterhouses and breeding farms, some so questionable and involving so much risk for the animal and the company and techniques that truly represent the technological advancements that properly take care of chicken no matter what extreme weather conditions are to be considered.

5.1 Results

Considering all the current procedures and techniques that are being used in slaughterhouses and breeding farms, some so questionable and involving so much risk for the animal and the company and techniques that truly represent the technological advancements that properly take care of chicken no matter what extreme weather conditions are to be considered. Breeding farms must meet ideal temperatures to properly ensure a stable growth throughout the year, having special equipment and technology to know how to contras the weather temperature and which measures to take into considerations when making changes in the cooling systems used at the breeding farms so that the chickens, depending on how big and mature they are can have the ideal temperature according to their body weight. As it is mentioned earlier on the paper, when chickens arrive to the farm, temperature must be held to an ideal temperature and as the chickens grow, temperature must be lowered every two week, due to the rapidly increasing weight when they are ready to be processed chickens must be held at an average between 19°C – 21C° when the birds are around 3 kilograms, rising temperatures abruptly will create stress, leading to loss of appetite which will immediately stop its growth and in extreme cases when temperatures over 30° are present the chickens won’t be able to withstand it and will eventually die, causing the waste of all of them and the veterinarians will have to fully put all that segment in quarantine to take all residues and to ensure that the arriving batch won’t grow in a contaminated environment.

The main factor to take into account when trying to successfully complete the steps from the chickens arriving to the farm, growing and transporting them to the slaughter house, main factor must be looked into, as mentioned before controlling the internal temperature of the farms, giving them the best possible care with the proper ammunitions and medical care, preparing a healthy and balances diet to ensure good quality in the meat with a proper lean meat and fat ratio, all of this thing have to be taken care of for the next step to be made, this next part of the process it's the one that involves the most risk of them all, since the three biggest processing plants in Mexico use this technique it has to be one to focused on.

As it was mentioned in chapter 4, when the transportation phase begins, chicken will be handpicked by the staff members of the farm, being carried four chickens in each hand and placing them in cages, then the cages get loaded into the transportation truck and mover to the slaughterhouse, this process normally being really harmful for the chickens gets and even higher risk when high temperatures are present, chickens must be transported at night and due to the weather a smaller amount must be loaded this impacts negatively on the transporting and loading crew since transportation time also gets decreased to be able to move as much chickens as possible and match the standard rate of processed chickens, this make the handling of the birds careless since the only objective its catching and moving them as fast as possible, resulting in bruised bodies, broken bones, stressed animals and in extreme cases dead, leaving some uncapable to be processed even before arriving to the processing plant, when arriving same procedure it's made to un load the cages from the trucks and to take the birds out, immediately after arrival a cooling system will not stop going to maintain an ideal temperature and give the chickens time to relax and reduce the stress caused by the transportation process until they are selected and weighted to know what kind of product they are eligible for according to the condition they arrived on.

5.2 Conclusion of Findings

After the thorough analysis of the information gathered many of the assumptions that were made through out the investigation had to be rejected due to the nature of the discovered data, when having to take many different factors into consideration to a complex problem, like focusing on the reduction of mortality during heat season, many areas have to be investigated and looked at just to comprehend the root causes and properly asses why factors can be improves, eliminated or are fit for the process made by the company.

When thinking about how to create the perfect environment to successfully grow chickens in a farm ensuring a good quality and an acceptable waste rate, temperature must be health in between 20°C – 28°C, this temperature will have to be controlled withing the farms infrastructure to maintain an stress free environment that will make chicken mental and fiscal health to be optimal for weight gain, due to many different factors at breeding farms like budget, landscape or other external factors, plenty farms lack the necessary technology to ensure an stable temperature, this raises

many problem, stress being one of the most common and death being coon on fully grown chickens due to the lack of capability to adapt to the fast raising temperatures. Nutrition must also be controlled, meaning that every single meal must be calculated to don't over feed the birds but to ensure the fast growth, creating healthy specimens that won´t just be made of fat but with an ideal fat to lean meat ratio.

When thinking about key factors to target when trying to reduce mortality risks, as mentioned before, external factors are the biggest risk makers, factors like weather, wildlife, outside bacteria of viruses, etc. a complete isolation must be considered, to create an ideal environment where the only priority animal that inhabits the farms are chickens, to eliminate exposure risks, this only considering the breeding and growth part of the process. After the growth process has been successfully the logistics team has to successfully bring them into the slaughterhouse for the chickens to be processed, This being the most risk full part of the studied process, in Mexico rudimentary transportation techniques are utilized to catch, store, load and transport the chickens, this process creates unnecessary stress that can be prevented or reduce, drastically reducing the amount of unelidable specimens that arrive to the processing plan due to injuries or due to all the created stress cannot even arrive alive to be processed, showing the lack of effectivity that this commonly used process has.

Being pointed out by veterinarian and logistics teams from various chicken meat selling companies, policies and law in Mexico are really strict when talking about the amount of chickens that can be on a specific space at a time, the necessary medic care that chickens must receive, being the only are that properly prevents unnecessary animal suffering, inly lacking when giving specific quantities of chickens that can be transported at the same time, creating risks that increase stress for the bird when companies try to regularize the amount of chickens that are regularly transported. Trying to obtain an external supplier to mitigate these shortages in Mexico was also found to be not possible since the product that has the heist demand in Mexico its fresh chicken meat and only chicken products could be imported into Mexican market without drastically increasing prices and reducing quality, which make this option completely unmatchable for the purpose of the paper.

5.3 Recommendation & solutions

The optimization of processes in any industry must be a priority in order to maintain a competitive stance in the market, targeting the main flaw that was found throughout this paper it can be certainly said that the logistics department lack in the goal of safely handling chickens for them to be moved in a stress free environment which will ensure the highest possible amount of chickens will arrive in the best conditions to the processing house to be turned into finished products.

The implementation of an automated chicken harvester would be ideal to address this existing problem, utilizing robber bands to harvest the chickens, rough handling its prevented, reducing

significantly stress and damage received by the chickens and to employees too. These technologies have shown to reduce injuries in chickens by to 50%, being a common practice used in many countries like England, Australia, and Norway, being countries that have developed and perfected this technology that can drastically improve efficiency and drastically reducing waste.

When focusing on the cargo when its loaded already, implementing cooling systems in the transporting trucks will mitigate the head that its produced due to the amount of chickens places in a confined space, ensuring that throughout all the transportation until the arrival, temperature will maintain a constant level, ensuring that chickens will reduce the probability of death caused by high stress levels and will not get over stimulated due to the accommodating temperature depending of the weather and the average weight per chicken, as it was successfully tested in Denmark (Poultry World, 2015).

There are many existing methods that can create a safer environment for chickens when loaded in a transportation truck, the implementation of ergonomic ventilation crates by Giordano Poultry Plast offers the market crates made from UV-stabilized HD polyethylene, creating a controlled ventilation system that allows chickens to cool down maintaining a safe temperature and optimizing air ventilation and reduce cleaning costs to companies due to the design that allows a more efficient sanitation process, this option being more affordable that utilizing cooling systems can decrease the stress in chicken but can only be used when the weather it’s not too cold or reining since it would work the opposite way generating a hostile environment with make it a remarkable option when heat season begins, (Veterinaria Digital, 2023).

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Attachments

1. Logistics interview questions in English

Logistics Department

1. How does seasonality impact your logistics planning for a stable supply of poultry year round?
2. What measures are currently used to track temperature?
3. What measures are currently used to measure temperature during transportation?
4. Which logistical challenges arise when ensuring ideal breeding conditions across the supply chain?
5. What factors could be improved to optimize the supply chain from breeding to processing stages?
6. How do you address regulatory requirements within your logistics framework to minimize risks?
7. In your opinion, could importing poultry products mitigate risks in supply stability, and what would be the implications for logistics?

2. Logistics interview questions in Spanish

Departamento de Logística

1. ¿Cómo impacta la temperatura climática en la planificación logística para garantizar que los productos lleguen en el mejor estado posible?
2. ¿Qué medidas se utilizan actualmente para monitorear la temperatura?
3. ¿Qué medidas se utilizan actualmente para monitorear la temperatura durante el transporte?
4. ¿Qué desafíos logísticos surgen al garantizar condiciones ideales de cría a lo largo de la cadena de suministro?
5. ¿Qué factores podrían mejorarse para optimizar la cadena de suministro desde la etapa de cría hasta el procesamiento?
6. ¿Cómo se abordan los requisitos regulatorios dentro del marco logístico para minimizar riesgos?
7. En su opinión, ¿podría la importación de productos de pollo a mitigar los riesgos en la estabilidad del suministro? ¿Cuáles serían las implicaciones logísticas?

3. **Veterinary interview questions in English**

Veterinary Department

1. What are the critical conditions needed to maintain chicken health for consistent breeding?
2. Which health related factors do you believe are essential from breeding to processing to maintain highquality production?
3. How do current animal welfare policies impact operations and are there any areas for improvement?
4. In terms of biosecurity, how are health risks managed, and what policy changes would support safer operations?
5. Which changes in the breeding process could be approached to reduce mortality rates in heat seasons.

4. **Veterinary Interview Questions Spanish**

Departamento de Veterinaria

1. ¿Cuáles son las condiciones ideales para mantener la salud de los pollos y garantizar una cría constante?
2. ¿Qué factores relacionados con la salud considera esenciales, desde la cría hasta el procesamiento, para mantener una producción de alta calidad?
3. ¿Cómo impactan las políticas actuales de bienestar animal en las operaciones? ¿Existen áreas que podrían mejorarse?
4. En términos de bioseguridad, ¿cómo se gestionan los riesgos sanitarios y qué cambios en las políticas podrían apoyar operaciones más seguras?
5. ¿Qué cambios en el proceso de cría se podrían implementar para reducir las tasas de mortalidad durante las temporadas de calor?

5. Stakeholder Questions English

Stakeholders

1. To what degree can you perceive that poultry shortages affect the market during hot season?
2. What are your expectations regarding the ideal breeding conditions to ensure a reliable year round supply?
3. Thinking of a constant supply throughout the year, market demand would still be the same or which areas would be affected regardless of the supply?
4. Which aspects of the production process do you think should be prioritized for improvement?
5. What concerns do you have regarding potential risks in the poultry supply?
6. Which factors would be key for you to consider purchasing imported products?

6. Stakeholder Questions Spanish

Distribuidores

1. ¿En qué medida percibe que la escasez de pollo afecta al mercado durante la temporada de calor?
2. ¿Cuáles son sus expectativas en cuanto a las condiciones ideales de cría para garantizar un suministro confiable durante todo el año?
3. ¿Cree que de tener un suministro constante durante todo el año ayudaría al mercado a mantenerse estable o cree que la demanda bajaría de cualquier forma?
4. ¿Qué aspectos del proceso de producción considera que deberían priorizarse para su mejora?
5. ¿Qué preocupaciones tiene respecto a los posibles riesgos en la caída suministro de pollo a lo largo del año?
6. ¿Que aspectos consideraría importantes para abrir la posibilidad de comprar productos de pollo importados de otro país durante temporadas de escases?