

Geospatial Mapping of Agro-Livestock Industry in Louisiana: Trends, Challenges, and Opportunities

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Abstract

Livestock production plays a crucial role in Louisiana's agricultural sector, supporting rural communities, enhancing food security, and driving economic activity throughout the state. Despite growing research on livestock in Louisiana, this study offers a comprehensive view of the changes in Louisiana's livestock farming, addressing a gap in research that usually focuses on separate aspects. It aims to inform strategies that support the industry's sustainability and resilience. This study uses secondary data from credible sources to analyze livestock inventories, farm numbers, and economic indicators. This study used both quantitative and qualitative methods to analyze trends, opportunities, and challenges in Louisiana's livestock industry. That is, a GIS-based method was used to visualize parish-level cattle, calf, and beef cow production in Louisiana for 2022, 2023, and 2024. Livestock data was organized into an attribute table in ArcGIS Pro and linked to Louisiana's shapefile. Six maps were created using the symbology tool and a graduated color scheme to illustrate the spatial distribution of cattle and beef cows across the state. Quantitative analysis also assessed changes in livestock numbers, farm sizes, and economic impact using time-series data, while qualitative insights were structured around a Strengths, Weaknesses, Opportunities and Threats (SWOT) framework to evaluate key factors affecting the sector. The study reveals that Louisiana's livestock sector has become more efficient, but it faces recent declines in cattle and dairy production due to climate stress, rising costs, and the aging of producers. This study recommends that for Louisiana to advance, efforts

should be directed toward implementing climate-resilient strategies, expanding local processing capacity, and supporting beginning farmers.

Keywords

Economic Impact Analysis, Animal Agriculture, Livestock Spatial Distribution, Climate Resilience, GIS Mapping

1. Introduction

Agriculture has played a pivotal role in Louisiana's economic development and remains a vital industry, despite the state's increasing economic diversification [1]. About 60% of Louisiana's agricultural income comes from crops, while livestock and related products account for the remaining 40%. Additionally, the top five income-generating products are sugarcane, rice, cattle and calves, soybeans, and cotton whereby cattle and calves contribute about 9% of the state's agricultural revenue. While dairy products, aquaculture including farm-raised catfish and crayfish, and hogs play significant roles, some fur-bearing animals are also farmed either for their pelts or trapped in the wild for fur [2]. Even though most studies have conducted research focusing on individual aspects of livestock farming in Louisiana, such as production challenges, there remains a lack of integrated analysis that connects long-term livestock population patterns, economic performance, and environmental pressures across the entire industry. Therefore, this study seeks to fill the gap in current research by providing a comprehensive assessment of livestock farming dynamics, geographic distribution patterns, potential opportunities as well as economic indicators and challenges in Louisiana.

According to [3], the pandemic affected all agricultural commodities in Louisiana, with seafood, crawfish, poultry, beef cattle, and dairy being the hardest hit due to their heavy reliance on restaurants and food services. Additionally, the closure of major poultry and beef processing plants caused major disruptions in marketing channels. However, federal aid helped these industries reduce financial losses and stay afloat during this period. Louisiana's animal agriculture sector has experienced some decline amid economic challenges over the past decade, with a \$92.7 million drop in output, a \$21.2 million decrease in household earnings, the loss of 1047 jobs, and a \$5.1 million reduction in income tax contributions [4] [5]. Also highlight that grazing animals can influence the grassland's role as a nutrient source by changing how nutrients are distributed and lost to water. Their activity can shift both the location and composition of nutrients, and in some cases, cause soil damage that reduces grass growth.

Considering these factors, this study addresses the impact of long-term changes, recent challenges such as unfavorable weather conditions, fewer new farmers, and economic issues on the whole livestock industry in Louisiana. By analyzing the evolving landscape of livestock production, this study also investi-

gates trends, opportunities, and challenges by reviewing historical patterns in herd sizes, farm counts, and sectoral performance to uncover shifts in growth, decline, and industry consolidation. The research identifies promising developments, including the growth of broiler and egg production, advancements in technology, and emerging market prospects that could bolster economic stability. Simultaneously, it addresses critical issues such as environmental pressures, escalating input costs, shrinking beef cattle numbers, labor constraints, and inadequate infrastructure. The overall goal is to provide insights that can guide efforts to improve the resilience and long-term viability of livestock production in the region.

2. Data and Methods

2.1. Data Sources

This study relied primarily on secondary data collected from credible and authoritative sources. Historical and recent livestock inventory figures, farm numbers, and economic indicators were drawn from the United States Department of Agriculture (USDA) Census of Agriculture (1978-2007) and the USDA National Agricultural Statistics Service (NASS) for the period 2012-2024. Additional data on animal units, employment, earnings, and tax contributions by the livestock sector were obtained from the Louisiana State University Agricultural Center (LSU AgCenter) and the Louisiana Department of Agriculture and Forestry (LDAF). Supplementary information was gathered through a review of peer-reviewed literature, government publications, and extension reports to provide context and interpret emerging trends.

The study also employed a GIS-based approach to map parish-level cattle and calf, as well as beef cow, production in Louisiana for the years 2022, 2023, and 2024. Parish-level figures for all cattle and beef cow inventories in 2022 were derived from the Louisiana Cattle Parish. Estimates were issued by the United States Department of Agriculture, National Agricultural Statistics Service (USDA-NASS), Delta Regional Field Office. The dataset, titled *Cattle: Inventory on Farms - Louisiana by Parish, January 1, 2021 and 2022*, were released on May 10, 2023 and are based on the annual January Cattle Survey conducted by USDA-NASS [6]. Parish-level data on cattle and beef cow inventories for 2023 and 2024 were sourced from the Louisiana Cattle Parish Estimates report published by the United States Department of Agriculture's National Agricultural Statistics Service (USDA-NASS), Region Field Office (released May 13, 2024). This dataset, titled *"Cattle: Inventory on Farms - Louisiana by Parish, January 1, 2023 and 2024,"* presents estimates of total cattle and beef cows by parish, organized within agricultural districts [7].

The economic assessment in this study utilized animal unit (AU) conversions to standardize livestock inventories across different species, with species-specific conversion factors applied at their first mention in accordance with USDA-NASS guidelines. An Animal Unit (AU) is a standard measurement used to compare the feed requirements of different livestock species based on a reference of one mature

cow of approximately 1000 pounds (454 kg) with or without a calf up to 6 months of age [8]. Estimates of output, earnings, and tax contributions were derived from statewide livestock value data, supplemented with regional economic multipliers from [4] and [9]. These multipliers incorporate direct, indirect, and induced effects, offering a comprehensive representation of the livestock sector's economic impact.

2.2. Data Analysis

A combination of quantitative and qualitative methods was used to examine the distribution patterns, evolving trends, potential opportunities, and key challenges in Louisiana's livestock industry. The quantitative component analyzed changes in livestock numbers, farm counts, and animal units over time to reveal patterns in herd expansion or reduction, farm consolidation, and shifts within the sector. Techniques such as time-series analysis and calculations of percentage change were employed to measure variations across different periods. Comparative assessments were made to highlight differences in economic contribution among the various livestock types. ArcGIS Pro was then utilized to compile livestock data into an attribute table, which was then joined to a corresponding Louisiana shapefile.

Using the symbology tool and graduated color scheme, six separate maps were generated to display the spatial distribution of cattle and beef cow populations across the state. Parish-level cattle and beef cow inventories were categorized using the natural breaks (Jenks) method, which highlights the inherent groupings in the data by reducing variation within classes and increasing differences between them. This method ensures that the spatial patterns displayed on the maps represent actual variations in livestock distribution across parishes, rather than resulting from arbitrary or uniform class divisions. Mapping symbology thresholds were established based on livestock inventory ranges and refined iteratively to emphasize meaningful regional variations while preventing overgeneralization. Separate maps were produced for multiple livestock categories, including cattle, beef cows, and broilers, to illustrate both temporal trends. Data are compiled using producer-reported inventories from a representative sample of agricultural operations.

On the qualitative side, analysis followed a SWOT-based framework to interpret factors like environmental pressures, rising production costs, infrastructural constraints, adoption of modern technologies, and market prospects. Also, the animal unit (AU) values allow for consistent estimation of forage demand and stocking rates across mixed-species livestock operations. Common species-specific conversion factors include: 1 cow = 1 AU, 1 mature horse = 1.25 AU, 1 mature sheep = 0.2 AU, 1 mature goat = 0.2 AU, 1 feeder pig = 0.3 AU, and 1 mature bull = 1.25 AU. These conversions standardize different animal types to a common unit for grazing and feed planning purposes. Adjustments are made to account for nonresponse, coverage errors, and consistency with statewide totals re-

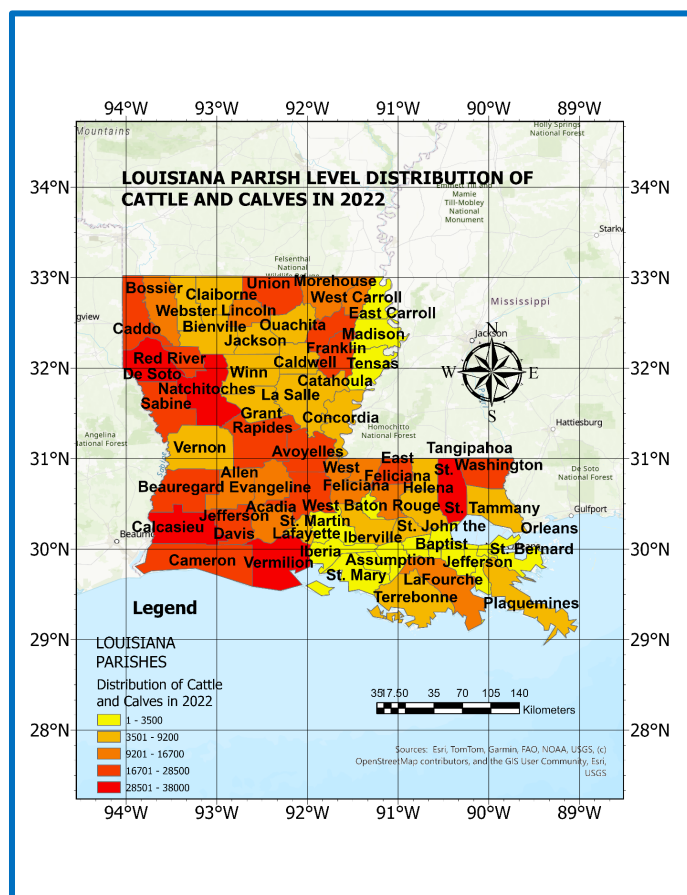
ported. The estimates were produced using a raking method that combines parish-level livestock information from the Census of Agriculture, administrative data, and state-level Agricultural Statistics Board (ASB) inventory and production figures [7]. Data for 2023 and 2024 were subsequently used to illustrate temporal patterns and map parish-level variations in cattle and beef cow inventories across Louisiana.

3. Results

3.1. Parish-Level Cattle and Beef Cows Estimates for Louisiana in 2022, 2023, and 2024

The 2022, 2023, and 2024 cattle and beef calves' data for Louisiana were organized by parish, offering a detailed look at how livestock populations were distributed throughout the state. This breakdown revealed the parishes with the highest concentrations and pinpointed major hubs of livestock production. The information provided a localized perspective on livestock farming, illustrating variations in herd sizes and agricultural practices across different regions.

3.1.1. 2022 Estimates of Cattle by Parish in Louisiana



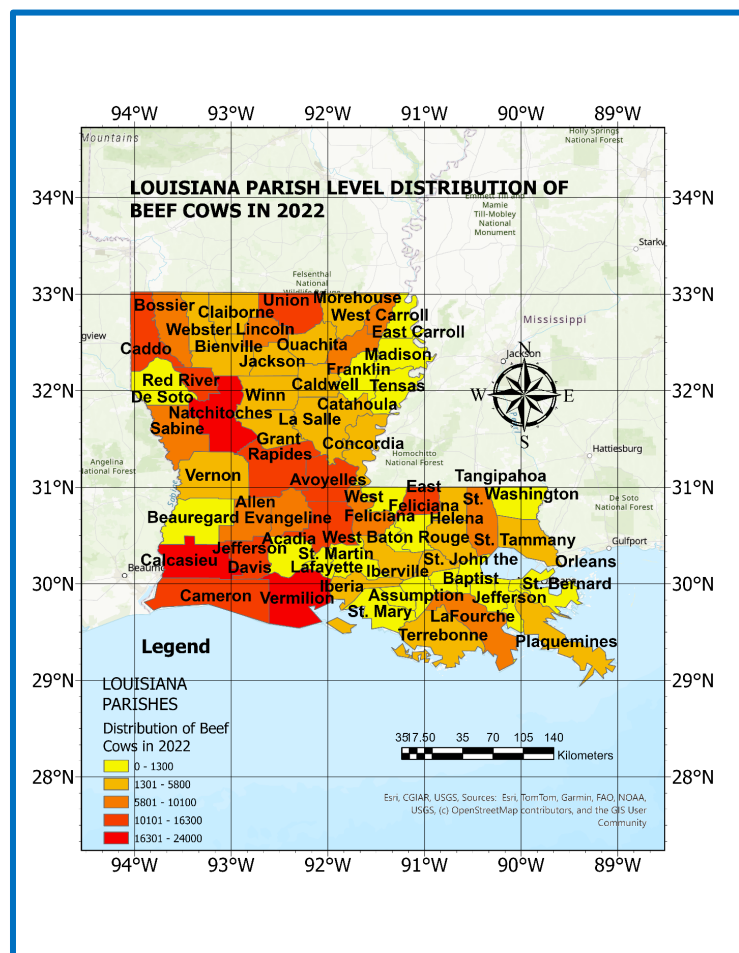
Source: [6].

Figure 1. 2022 estimates of cattle by parish in Louisiana.

Figure 1 presents the estimated number of all cattle and calves, as well as the number of beef cattle and cows in various parishes of Louisiana in 2022. Several parishes, such as Caddo Parish (22,000 cattle and calves, 12,400 beef cows) and Natchitoches Parish (38,000 cattle and calves, 22,500 beef cows), have some of the highest numbers of cattle and beef cows. These parishes are important for beef production in Louisiana. Rapides Parish (24,500 cattle and calves, 14,200 beef cows) and Vermilion Parish (35,000 cattle and calves, 23,500 beef cows) also have significant cattle populations (**Figure 1**).

3.1.2. 2022 Estimates of Beef Cows by Parish in Louisiana

As shown in **Figure 2** below, Calcasieu Parish has a significant number of beef cows (24,000 beef cows out of 37,500 cattle and calves). Tangipahoa Parish is another major contributor, with 37,500 cattle and calves, 18,800 of which are beef cows. Some parishes like Orleans and St. John the Baptist have their data included in other parish estimates. Parishes like Plaquemines and St. Bernard have moderate cattle numbers but do not show as significant a proportion of beef cows compared to other parishes (**Figure 2**).

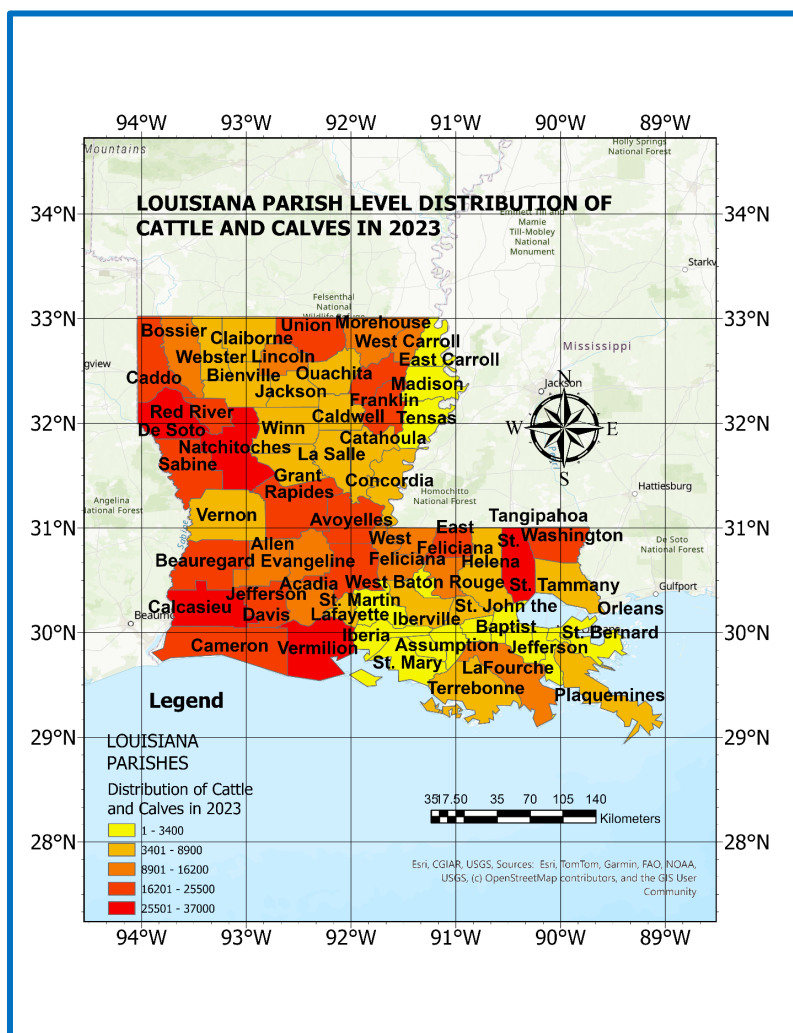


Source: [6].

Figure 2. 2022 estimates of beef cows by parish in Louisiana.

3.1.3. 2023 Estimates of Cattle by Parish in Louisiana

Figure 3 illustrates the parish-level distribution of cattle and calves in Louisiana for 2023, using a color-coded scale to represent varying population densities. It shows that cattle production is most concentrated in the western and central regions of the state, particularly in parishes like Vermilion, Beauregard, Calcasieu, and Vernon, which fall into the highest category (25,501 - 37,000 head). Moderate levels are observed in nearby parishes such as Rapides, Evangeline, and St. Landry. In contrast, southeastern and urban parishes including Orleans, Jefferson, and Plaquemines have the lowest cattle numbers. This distribution highlights the regional nature of livestock production in Louisiana, with rural and agriculturally intensive areas serving as key hubs for cattle raising (**Figure 3**).



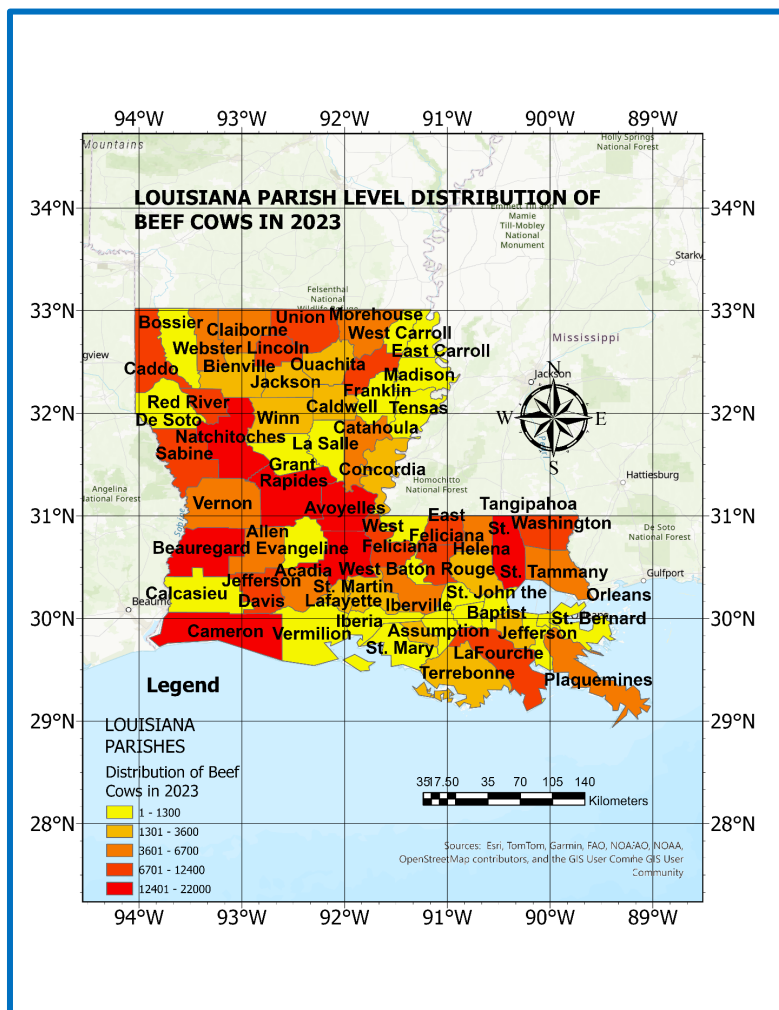
Source: [7].

Figure 3. 2023 estimates of cattle by parish in Louisiana.

3.1.4. 2023 Estimates of Beef Cows by Parish in Louisiana

Figure 4 displays the parish-level distribution of beef cows in Louisiana for the year 2023, categorized by population size using a five-color gradient. Parishes such

as Cameron, Beauregard, Natchitoches, and Evangeline are shown in deep red, indicating the highest concentration of beef cows (12,401 - 22,000 head). Surrounding areas like Vernon, Rapides, and St. Landry also exhibit substantial numbers, represented in orange (6701 - 12,400 head). In contrast, many southeastern parishes, including Orleans, St. Bernard, and Plaquemines, are shaded in light yellow, reflecting the lowest beef cow populations (1 - 1300 head). This spatial distribution highlights the prominence of beef cow farming in the western and central rural regions, while urban and coastal areas play a minimal role in beef cattle production (Figure 4).



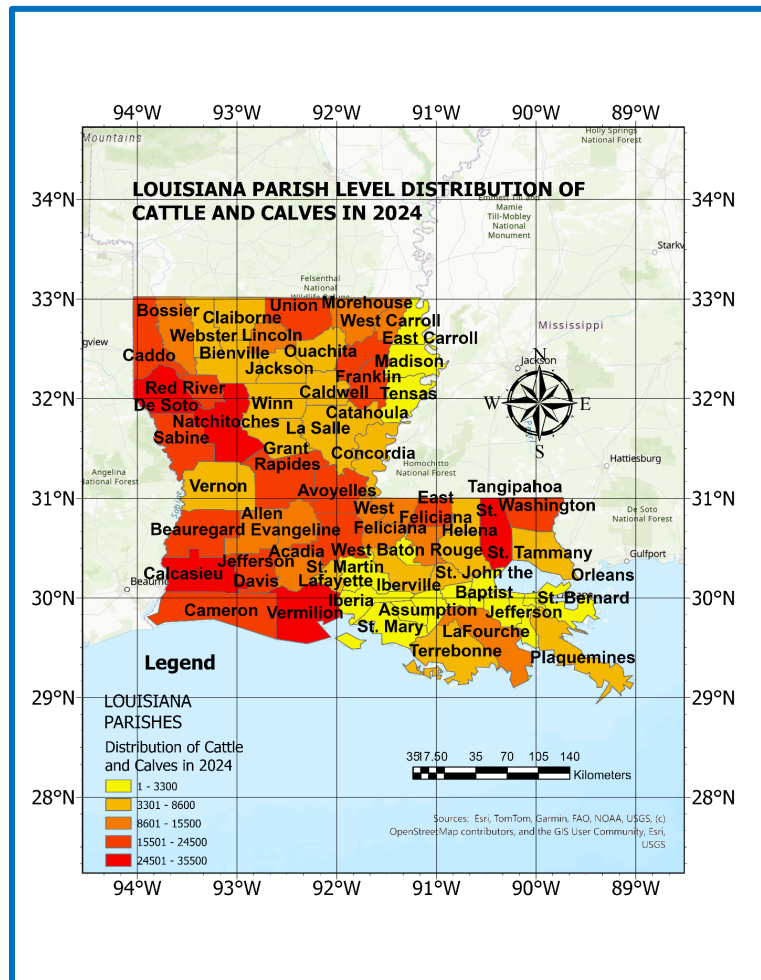
Source: [7].

Figure 4. 2023 estimates of beef cows by parish in Louisiana.

3.1.5. 2024 Estimates of Cattle by Parish in Louisiana

Figure 5 illustrates the parish-level distribution of cattle and calves in Louisiana for the year 2024, using a color-coded scheme to indicate population density. Parishes with the highest cattle and calf numbers (24,501 - 35,500 head) are shown in dark red, including Cameron, Vermilion, and Beauregard, highlighting their im-

portance as key livestock hubs. Orange-colored parishes such as Evangeline, Rapides, and East Baton Rouge have moderately high populations (15,001 - 24,500), while yellow and light-yellow shades represent parishes with smaller populations, ranging from 3301 to 15,000 head. The lightest areas, like Orleans and St. Bernard, reflect the lowest populations (1 - 3300), typically urban or coastal regions. This map reveals a concentration of cattle production in western and central Louisiana, with a clear decrease in herd density moving southeast toward more urbanized or environmentally constrained parishes (**Figure 5**).



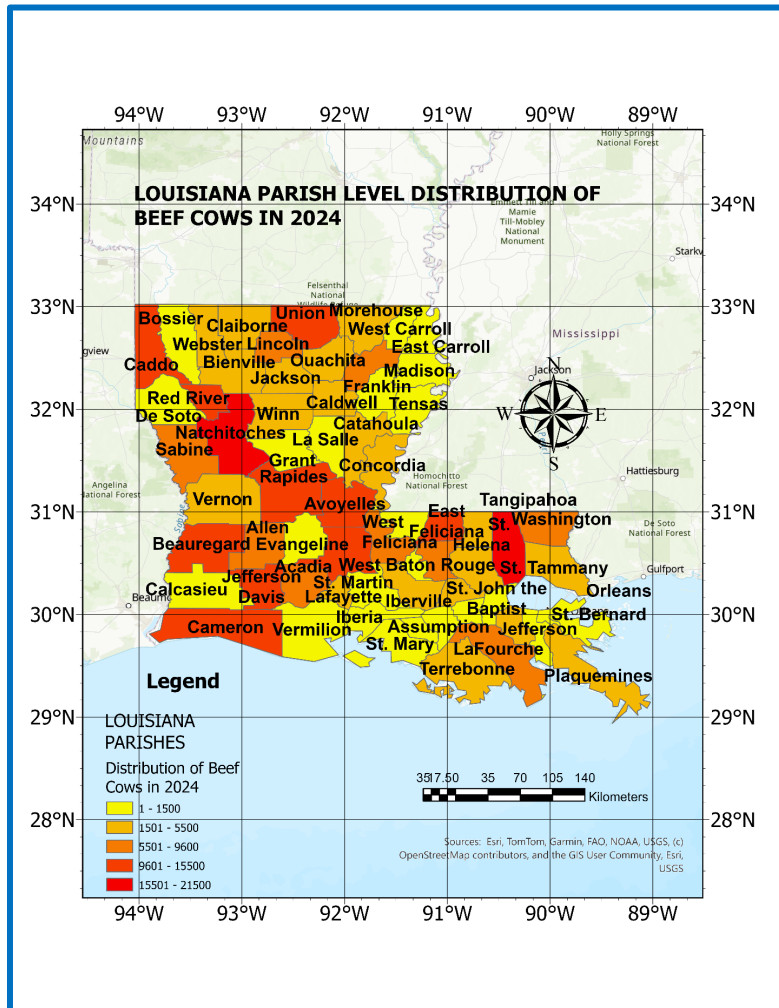
Source: [7].

Figure 5. 2024 estimates of cattle by parish in Louisiana.

3.1.6. 2024 Estimates of Beef Cows by Parish in Louisiana

Figure 6 shows the 2024 map of Louisiana’s parish-level distribution of beef cows. It illustrates significant regional variation in cattle populations. Parishes such as Vernon, Beauregard, Natchitoches, Rapides, and St. Landry show the highest concentrations, with over 15,500 beef cows each, marked in dark red. Surrounding parishes like Caddo, De Soto, Avoyelles, and Tangipahoa also have substantial cattle populations ranging from 9601 to 15,500. Central and western Louisiana

generally dominate in beef cow density, while eastern and coastal parishes including Orleans, Plaquemines, and St. Bernard have far fewer, with populations under 1500. The color-coded map, supported by data from sources like Esri, NOAA, and USGS, effectively highlights how cattle farming is more prevalent in inland and rural areas of the state (Figure 6).



Source: [7].

Figure 6. 2024 estimates of beef cows by parish in Louisiana.

3.2. Cattle and Calves Inventory Statistics for Louisiana from 1978 to 2007

In **Table 1**, the cattle and calves inventory statistics for Louisiana from 1978 to 2007 reveal notable shifts in both the number of farming operations and the overall cattle population during this 30-year span. In 1978, Louisiana recorded 19,532 farms and a peak inventory of 1,052,216 cattle and calves, the highest figure in the data set. By 1982, the number of farms saw a modest rise to 20,049, yet the cattle inventory declined to 1,003,833, signaling the start of a downward trend in herd numbers. This decline continued through 1987, as farm numbers fell to 16,033

and cattle inventory dropped to 813,295, likely indicating reduced production or a move toward herd consolidation. By 1992, the number of farms had decreased further to 15,036, but the cattle population showed a slight recovery, rising to 844,260, suggesting an improvement in herd sizes despite fewer operations. This upward momentum continued into 1997, when cattle numbers reached 930,114 across 18,525 farms, pointing to a brief resurgence or expansion within the sector. In the following years, the decline resumed. By 2002, the number of farms had fallen to 15,022, with cattle inventory reduced to 855,717. In 2007, both metrics continued to shift 14,075 farms supported 878,664 head of cattle and calves. Despite the ongoing decrease in farm numbers, the slight uptick in cattle inventory from 2002 to 2007 suggests that producers were managing larger herds on average. Taken as a whole, the data highlights a gradual decline in the number of cattle farms, accompanied by fluctuating cattle inventories. This pattern reflects a trend toward industry consolidation, where fewer but more efficient and larger-scale operations are playing a dominant role. It mirrors broader changes in agricultural practices, driven by technological progress and the pursuit of economies of scale in livestock production (**Table 1**).

Table 1. Cattle and calves inventory statistics for Louisiana from 1978 to 2007.

CATTLE AND CALVES INVENTORY	2007	2002	1997	1992	1987	1982	1978
FARMS	14,075	15,022	18,525	15,036	16,033	20,049	19,532
NUMBER	878,664	855,717	930,114	844,260	813,295	1,003,833	1,052,216

Source: [10].

3.3. Beef Cows Inventory Statistics for Louisiana from 1978 to 2007

In **Table 2**, the beef cow inventory records from 1978 to 2007 highlight notable variations in both the number of farms and the total beef cow population in Louisiana. In 1978, Louisiana recorded 16,869 farms managing a total of 523,342 beef cows, one of the highest figures within the timeframe. By 1982, these numbers slightly decreased to 16,936 farms and 480,918 cows, suggesting a modest reduction in herd size. The downward trend continued in 1987, with 13,551 farms and 422,604 beef cows, indicating ongoing shrinkage in both farm numbers and cattle inventory. In 1992, while the number of farms declined further to 12,669, the beef cow population slightly rebounded to 441,725, possibly pointing to a rise in the average herd size per farm. This upward trend in inventory persisted into 1997, when the number of cows rose to 504,611, even though the number of farms only slightly increased to 15,701, potentially signaling consolidation or farm expansion. By 2002, the count of farms dropped again to 12,775, accompanied by a decrease in cattle numbers to 478,428. However, in 2007, beef cow numbers climbed back to 510,837, even as the number of farms further declined to 12,355, suggesting a

shift toward fewer farms managing larger herds. In summary, the data reveals a gradual decline in the number of beef cow farms over time, while the beef cow inventory has shown periodic increases, particularly among fewer, likely more efficient, operations. This trend points to an industry undergoing consolidation, with a growing concentration of livestock among a smaller number of larger-scale producers.

Table 2. Beef cows inventory statistics for Louisiana from 1978 to 2007.

BEEF COWS INVENTORY	2007	2002	1997	1992	1987	1982	1978
FARMS	12,355	12,775	15,701	12,669	13,551	16,936	16,869
NUMBER	510,837	478,428	504,611	441,725	422,604	480,918	523,342

Source: [10].

3.4. Trends in Cattle, Calves, and Beef Cows in Louisiana from 2022 to 2024

As shown in **Table 3**, between 2022 and 2024, Louisiana experienced a noticeable and troubling decline in both cattle and calves, as well as beef cow numbers. The total cattle and calves' population dropped from 775,000 to 720,000, a decrease of 55,000 head, or approximately 7.1%. Likewise, the number of beef cows, which form the core of the beef production system, declined from 451,000 to 428,000, marking a 5.1% reduction. These figures indicate that the state's livestock sector, particularly beef cattle farming, is facing ongoing shrinkage. Multiple factors likely explain this downward trend. Environmental issues such as prolonged drought and unpredictable weather conditions that have become more frequent due to climate change can diminish pasture quality and limit water availability. At the same time, rising expenses for feed, fuel, veterinary care, and labor may be making it more difficult for farmers to maintain or expand their herds. The lingering economic impact of the COVID-19 pandemic, compounded by inflation, may also have contributed to reduced profitability and lower investment levels across the cattle industry. These pressures may be forcing some producers to downsize or exit the business entirely.

The drop in beef cow numbers is particularly critical, as it points to a declining breeding population. With fewer cows available to produce calves, future herd sizes are likely to shrink further, potentially tightening beef supplies. Although this could result in higher market prices that benefit some producers temporarily, it does not resolve the deeper, long-term problems of reduced production potential and increased economic instability within the industry. Reversing this trend will require a mix of policy solutions, financial assistance, and modern agricultural approaches. Promoting the use of drought-tolerant forage, improving water access, and adopting climate-adaptive livestock systems will help farmers withstand environmental pressures. Strengthening extension services and veterinary care can also enhance herd health and productivity. Furthermore, expanding access to

local and regional meat processing infrastructure could improve market opportunities. Finally, offering incentives such as grants, subsidies, and low-interest loans to support herd rebuilding may be essential for restoring growth and ensuring the long-term resilience of Louisiana's cattle industry.

Table 3. Trends in cattle, calves, and beef cows in Louisiana from 2022 to 2024.

NUMBER OF HEAD	2022	2023	2024
CATTLE AND CALVES	775,00	750,00	720,000
BEEF COWS	451,000	437,000	428,000

Source: [7].

3.5. Livestock Animal Units in Louisiana from 2012 to 2022

Table 4 presents the number of Animal Units (AUs) in Louisiana from 2012 to 2022, highlighting trends in various livestock categories, including beef cattle, hogs and pigs, broilers, turkeys, egg layers, and dairy cattle. Beef cattle represented a major component of Louisiana's livestock sector throughout the period. The number of beef cattle animal units remained relatively stable, fluctuating slightly from 705,305 in 2012 to 721,085 in 2022. The highest recorded value was 755,023 AUs in 2018, while the lowest occurred in 2016 at 700,699 AUs. Overall, the data indicates a steady presence of beef production in the state, with some resilience to fluctuations in livestock dynamics.

Hog and pig animal units remained consistently low over the decade. From 1404 AUs in 2012, the values hovered around this range until 2021. However, there was a noticeable decline in 2022, dropping to 912 AUs. This reduction suggests a declining trend in hog and pig production in recent years, possibly due to market changes or shifts in producer focus. In contrast, broiler production (chickens raised for meat) exhibited a clear growth trend. Starting at 462,912 AUs in 2012, the numbers rose significantly to peak at 572,687 in 2020, before settling at 568,882 in 2022. This increase underscores the growing importance of broiler farming in Louisiana's agricultural economy, likely driven by rising consumer demand and efficient production systems.

Turkey production, on the other hand, was minimal and steadily declined throughout the decade. Beginning with 60 AUs in 2012, the numbers gradually dropped to 32 AUs by 2022. This data reflects a marginal role of turkey farming in the state's livestock industry, possibly limited to niche markets or small-scale operations. Egg layers (hens raised for egg production) showed a general upward trend over the years. From 9148 AUs in 2012, the count rose to 12,946 in 2022, peaking at 13,695 in 2018. This growth indicates a strengthening egg production sector, which may be responding to increased local consumption and commercial expansion. Lastly, dairy cattle experienced a significant and steady decline over the study period. The number of AUs dropped from 36,588 in 2012 to just 18,294 in 2022. This represents nearly a 50% decrease, suggesting substantial challenges in the dairy industry, such as market pressures, rising input costs, or competition

from other regions.

Overall, the data reveals contrasting trends in Louisiana's livestock production. While broiler and egg production have grown steadily, dairy and turkey farming have declined, and beef cattle have remained relatively stable. These trends reflect broader shifts in agricultural practices, market demand, and possibly environmental or policy factors influencing livestock production in the state.

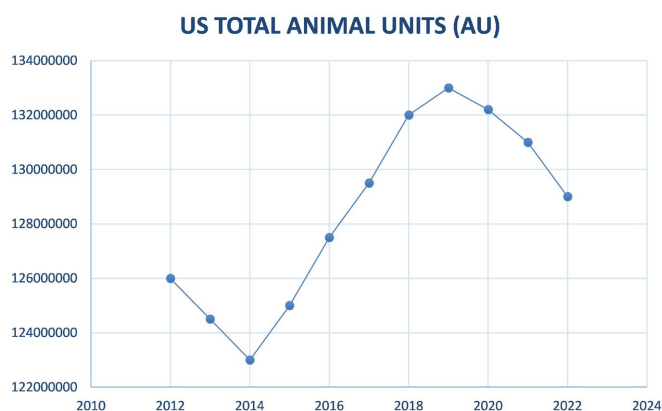
Table 4. Livestock animal units in Louisiana from 2012 to 2022.

Animal Units (AUs)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Beef Cattle	705,305	709,429	706,323	723,753	700,699	712,326	755,023	729,717	724,108	711,261	721,085
Hog and Pig	1404	1434	1438	1437	1352	1322	1322	1323	1325	1324	912
Broiler	462,912	461,317	458,715	470,551	474,076	518,969	519,331	519,150	572,687	550,584	568,882
Turkey	60	55	56	55	55	47	45	40	32	31	32
Egg Layer	9148	9304	9439	10,377	11,824	13,288	13,695	13,290	12,770	12,706	12,946
Dairy	36,588	32,234	30,493	28,763	27,042	24,438	24,4438	22,669	20,033	20,053	18,294

Source: [4].

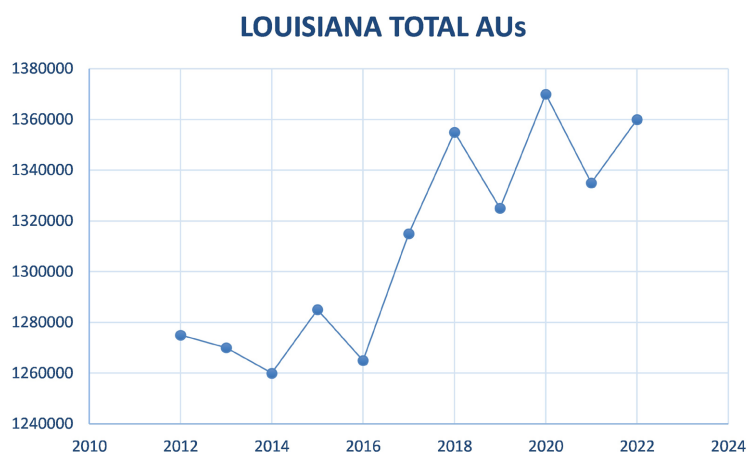
Total Animal Units in the United States and Louisiana

As shown in **Figure 7**, in 2022, the total number of Animal Units (AUs) in the United States declined by 1.4%, reaching 129.2 million, a continuation of the downward trend that began in 2019. Of the ten animal categories monitored, nine experienced declines, with broilers being the only exception. The majority of the national decrease, exceeding 70%, was attributed to reduced beef cattle numbers. In contrast, Louisiana reported an increase in total AUs, rising by 1.8% from the previous year to 1.36 million in 2022, as displayed in **Figure 8**. Between 2012 and 2022, the state averaged 1.31 million AUs annually. Since 2012, Louisiana's total AUs have grown by 6.4%, highlighting a gradual upward trend in the state's livestock population.



Source: [4].

Figure 7. Total animal units in the United States.



Source: [4].

Figure 8. Total animal units in Louisiana.

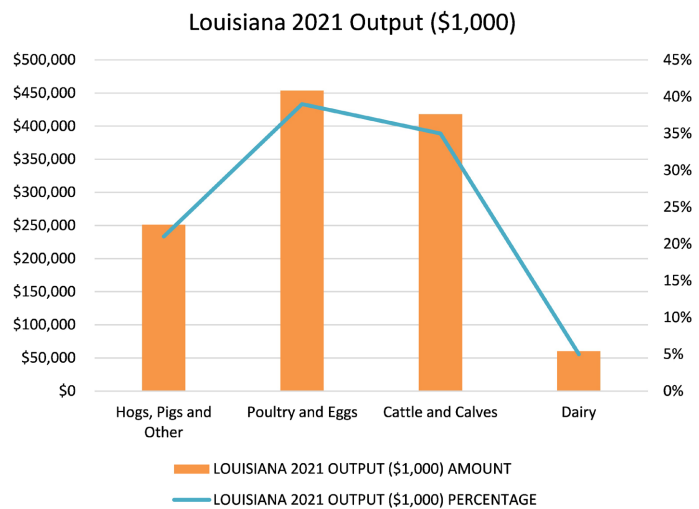
3.6. Louisiana Livestock Output in 2021

Figure 9 shows the 2021 livestock output in Louisiana, measured in thousands of U.S. dollars and expressed as both monetary value and percentage of total livestock production. It provides a snapshot of the economic contribution of major livestock sectors in the state. In 2021, poultry and eggs were the leading contributors to Louisiana's livestock economy, generating \$453.8 million, which accounted for 39% of the total livestock output. This underscores the strong commercial presence of poultry farming, particularly broilers and egg production. Cattle and calves followed closely, contributing \$418 million, or 35% of the total. This highlights beef cattle as a significant component of the state's agricultural output, in line with their consistent animal unit numbers over the past decade. Hogs, pigs, and other livestock brought in \$251.2 million, representing 21% of the total. Despite their relatively low animal unit count compared to other livestock, this figure suggests the presence of high-value operations or niche markets within the hog and pig industry. Finally, dairy accounted for only \$60.1 million, or 5% of total output. This aligns with the steady decline in dairy animal units over the years, reflecting a shrinking dairy sector likely facing structural and economic challenges. Overall, the data confirms that poultry and cattle dominate livestock production in Louisiana by economic value, while dairy plays a much smaller role.

3.7. Louisiana Livestock-Related Jobs in 2021

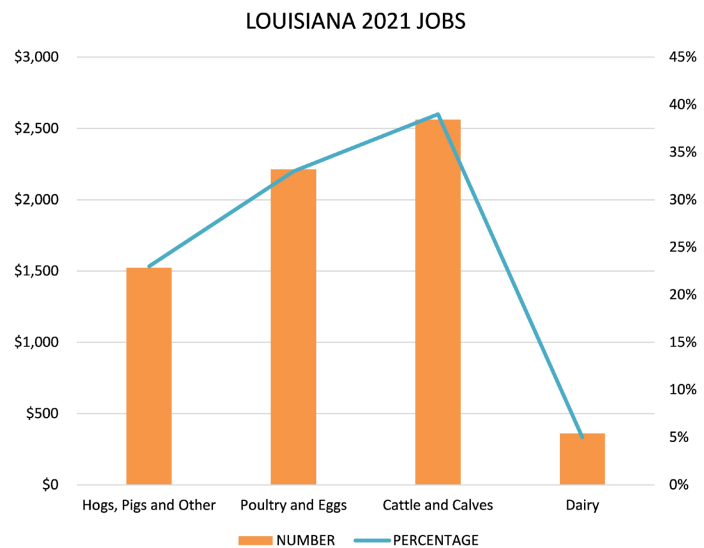
Figure 10 displays Louisiana's 2021 livestock-related employment data, indicating the number of jobs and their percentage share across major livestock sectors. It offers insight into the labor impact of each segment within the agricultural economy. The cattle and calves sector provided the highest employment, with 2562 jobs, accounting for 39% of total livestock-related jobs. This reflects the labor-intensive nature of cattle farming and its widespread presence across the state. Poultry and eggs followed, contributing 2213 jobs or 33% of the workforce. Given the sector's leading role in revenue generation, this also indicates significant labor

demand, especially in poultry processing and egg production facilities. Hogs, pigs, and other livestock accounted for 1523 jobs, which represents 23% of livestock employment. Although hog production contributes less to total animal units, it still supports a substantial number of jobs, possibly due to processing and management operations. Dairy supported the smallest share of employment, with only 360 jobs, or 5%. This aligns with the sector’s declining output and shrinking herd size, reflecting limited economic and labor contributions in recent years. In summary, cattle and poultry dominate livestock employment in Louisiana, while dairy has a minimal impact. The data shows a strong correlation between production scale and job creation, highlighting where labor resources are most concentrated within the livestock industry.



Source: [4].

Figure 9. Louisiana livestock output in 2021.

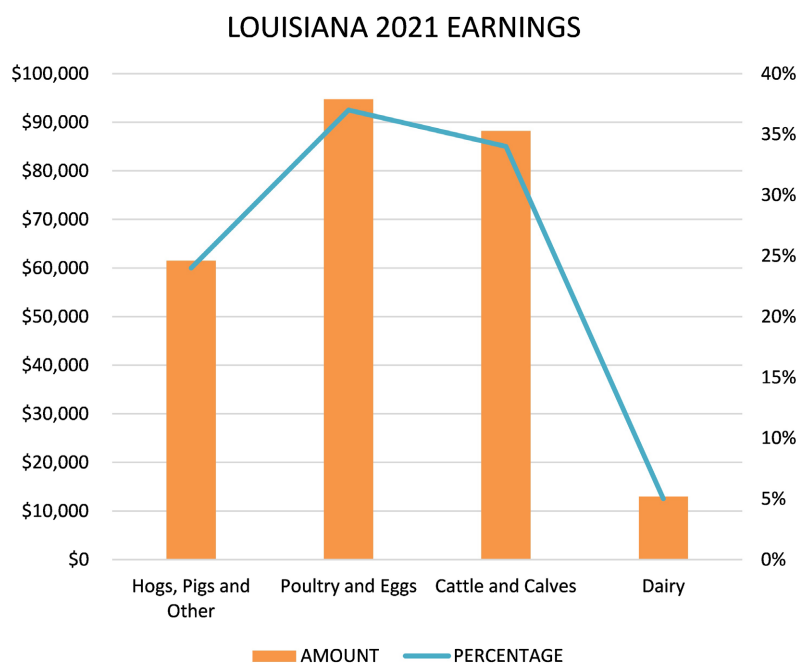


Source: [4].

Figure 10. Louisiana livestock-related jobs 2021.

3.8. Louisiana Livestock-Related Earnings in 2021

Figure 11 presents data on Louisiana's 2021 earnings from livestock-related employment, showing the total earnings (in thousands of dollars) and percentage contribution by livestock sector. The poultry and eggs sector led in earnings, generating \$94.7 million, which accounted for 37% of total livestock earnings. This aligns with its leading role in output and job creation, indicating its strong economic performance and importance to rural livelihoods. Cattle and calves followed closely, with \$88.2 million in earnings, making up 34% of the total. This confirms the sector's significance not just in production volume but also in its contribution to worker income. Hogs, pigs, and other livestock accounted for \$61.5 million, or 24% of earnings. While the sector employed fewer people compared to cattle and poultry, it still delivered a substantial income share, suggesting relatively competitive wages or specialized roles. Dairy, once again, had the smallest contribution, with \$13 million, or 5% of earnings. This corresponds with its limited role in both output and employment, reflecting broader challenges facing dairy producers in Louisiana. In summary, poultry and cattle dominate livestock earnings in Louisiana, together accounting for over 70% of the total. The earnings distribution closely mirrors job and output patterns, reinforcing the economic centrality of these two sectors within the state's livestock industry.



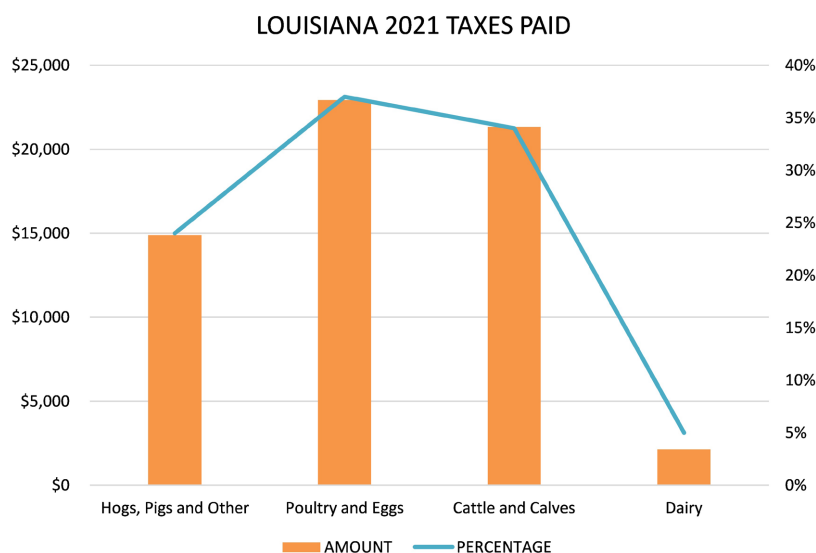
Source: [4].

Figure 11. Louisiana earnings in 2021.

3.9. Louisiana Taxes Paid by Animal Agriculture

Figure 12 presents Louisiana's 2021 livestock-related tax contributions, measured in thousands of U.S. dollars, and indicates each sector's percentage share of total

taxes paid. The poultry and eggs sector contributed the most in taxes, paying \$22.9 million, or 37% of the total. This reflects its dominant role in both earnings and output, as well as its substantial workforce and commercial scale. Cattle and calves followed with \$21.3 million in taxes, making up 34% of the total. This is consistent with the sector’s strong economic footprint in the state, both in terms of employment and income generation. Hogs, pigs, and other livestock paid \$14.9 million in taxes, accounting for 24%. While this sector trails behind poultry and cattle in overall output and jobs, its tax contribution is still significant, indicating a profitable and active industry. Dairy contributed the least in taxes, with \$2.1 million, or 5% of the total. This aligns with the sector’s smaller size, lower output, and declining trend in animal units and employment. In summary, tax contributions from Louisiana’s livestock sectors in 2021 closely mirror their respective economic activities. Poultry and cattle remain the primary drivers of fiscal revenue in the agricultural sector, while dairy continues to have a limited impact.

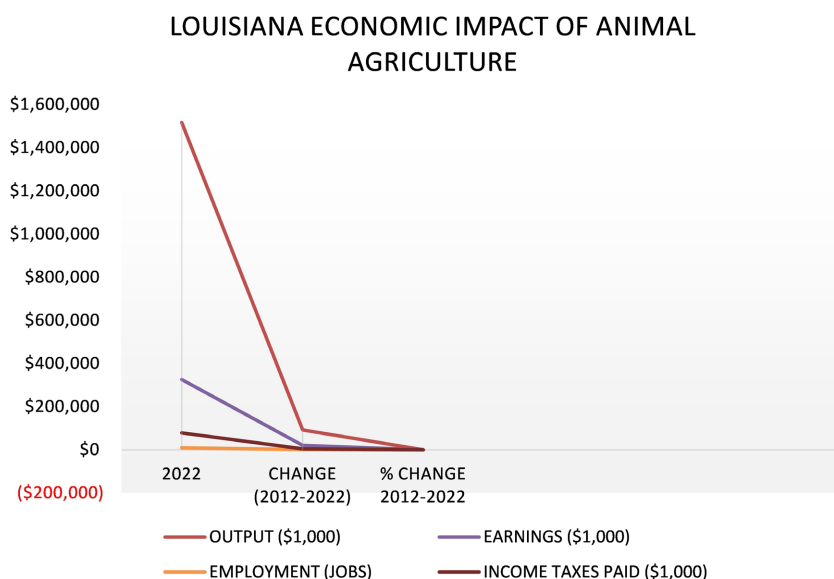


Source: [4].

Figure 12. Louisiana taxes paid by animal agriculture.

3.10. Louisiana Economic Impact of Animal Agriculture

Figure 13 shows a marked decline in the sector’s performance between 2012 and 2022. In 2022, animal agriculture in Louisiana generated approximately \$1.5 billion in output, followed by roughly \$300 million in earnings, with smaller contributions to employment and income taxes. However, both the “Change (2012-2022)” and “% Change (2012-2022)” sections show steep downward trends across all four categories—output, earnings, employment, and income taxes paid indicating that the industry has experienced significant contraction over the past decade. The visual emphasizes the sharp drop in economic impact, with output showing the most substantial decline. Overall, the data suggests a weakening role of animal agriculture in the state’s economy during this period.



Source: [4].

Figure 13. Louisiana economic impact of animal agriculture.

4. Discussion

4.1. Livestock Production Trends in Louisiana

Over the past several decades, livestock production in Louisiana has experienced significant transformation, shaped by market demands, technological advances, environmental conditions, and agricultural policies. Historical data show mixed trends in livestock prices: in 2019, cattle prices declined due to processing disruptions and slow marketing, while poultry prices slightly fell because of increased production. Dairy prices rose modestly due to better supply conditions and growing domestic and export demand. Other livestock, including horses, sheep, goats, and pigs, experienced modest price increases [11]. Geographic conditions, feed availability, and regulations further influence the distribution of livestock types [4]. In 2022, Louisiana's leading animal agriculture segments by animal units (AUs) were beef cattle (721,085), broilers (568,882), and horses (34,668), totaling 1.36 million AUs statewide. Beef cattle remain the predominant livestock type, with most operations being small to medium-sized cow-calf farms implementing improved breeding techniques, enhanced forage management, and comprehensive herd health programs [12].

The sector is increasingly diversifying. Producers are adding goats, sheep, and poultry to broaden income streams and minimize risk, particularly targeting niche markets like specialty meats, organic products, or ethnic foods [13]. Adoption of technology and data-driven management including electronic identification (EID) tags, automated feeding systems, and precision agriculture tools has enhanced productivity and resource efficiency [14]. Environmentally sustainable practices are also expanding, with producers implementing waste management

systems, rotational grazing, and conservation efforts to protect soil and water quality, often with support from the NRCS [15]. Direct-to-consumer marketing has grown, especially after COVID-19 highlighted weaknesses in conventional supply chains. Farmers increasingly sell through farmers' markets, farm-to-table programs, and online platforms [13]. Meanwhile, farm consolidation continues, with fewer but larger operations, and participation by younger generations is declining, raising concerns about long-term sustainability [14].

4.2. Challenges of Livestock Production in Louisiana

Louisiana livestock producers face multiple challenges. The humid subtropical climate, heavy rainfall, high temperatures, and hurricanes disrupt grazing areas, contaminate water sources, and cause animal losses [12]. Adaptive grazing strategies, such as flexible management and learning under uncertainty, benefit ranches with larger landholdings or greater social and financial resources [16]. The warm, humid climate also favors the spread of parasites and livestock diseases, including liver flukes, ticks, bovine respiratory disease, and anaplasmosis, which reduce productivity and increase veterinary costs [14]. Feed availability and costs are additional constraints. Louisiana produces limited corn and soybean feed, requiring imports that expose farmers to market fluctuations and higher transportation expenses [13]. Econometric analysis shows that cattle prices in Southern states are highly sensitive to exogenous shocks, reflecting structural barriers and partial market integration [17]. Land-use competition, driven by urban expansion and industrial development, increases land costs and reduces grazing space [15]. Environmental regulations also pose challenges, particularly for smaller operations. Compliance with federal and state waste management and water quality laws, including the Clean Water Act, often requires significant investments in infrastructure. Labor shortages compound these issues, as declining rural populations and limited training opportunities reduce the availability of skilled workers for livestock management [13].

More so, Louisiana's livestock sector faces structural vulnerabilities with clear policy and economic implications. The decline in cattle inventories necessitates the need for targeted support, including incentives for climate-smart practices such as rotational grazing, improved forage management, and drought mitigation, to protect long-term productivity [16]. Compared with neighboring Mississippi, Louisiana may require more intensive interventions, including cooperative management models or consolidation, to stabilize herds and sustain rural economies [7]. Investment in local and regional processing infrastructure is critical to reduce bottlenecks, improve market access, and capture more value from livestock production [4] [18]. Expanding poultry operations and promoting value-added products, such as specialty meats and organic options, can increase economic returns while creating rural jobs. Strengthening human capital development and youth engagement is vital to mitigating labor shortages and ensuring the long-term sustainability of livestock management. From 2022 to 2023 for instance, Mississippi

saw its total cattle and calves inventory fall by 5%, decreasing from 860,000 to 816,000 head, while beef cow numbers declined by 6%, from 455,000 to 430,000 head [7]. By comparison, Louisiana experienced a 7.1% reduction in cattle and calves from 2022 to 2024, with beef cow numbers dropping 5.1% during the same period.

4.3. Opportunities in Livestock Production in Louisiana

Despite these challenges, livestock production contributes significantly to the state economy, generating \$2.5 billion in output and providing thousands of jobs [9]. In 2022, the sector produced \$1.5 billion in output, created 9618 jobs, and contributed over \$400 million in earnings and tax revenues [4]. Expanding processing capacity is a key opportunity. USDA grants through the Meat and Poultry Processing Expansion Program aim to improve local slaughter and processing facilities, enhancing market access and competitiveness for small- and medium-sized producers [18]. Climate-smart and conservation-oriented practices, supported through the Grazing Lands Conservation Initiative (GLCI) and Regional Conservation Partnership Program (RCPP), help improve pasture conditions, manage water resources, and reduce carbon emissions [19] [20]. Youth involvement and workforce development are vital for sustaining the sector. Programs such as the Southern University Agricultural Research and Extension Center's Livestock and Poultry Show educate young people about careers in animal agriculture, addressing labor shortages [21]. Urban agriculture initiatives, including SPROUT NOLA programs in New Orleans, enhance local food access and economic prospects [22]. Consumer demand for grass-fed, organic, and locally sourced products provides avenues for value addition and market differentiation, especially through direct-to-consumer sales and community-supported agriculture programs [13].

The state's fisheries and seafood production further contribute to economic stability, with significant shrimp, oyster, and crawfish output [3] [23]. Also, [16] emphasize adaptive grazing strategies and the importance of social and financial capital in coping with climate variability. [17] demonstrates that Southern cattle markets for instance, are highly sensitive to external shocks, with regional market friction limiting full price integration. These insights reinforce the need for adaptive, market-aware strategies to sustain Louisiana's livestock sector. Policymakers could support resilience through climate-smart practices such as rotational grazing, improved forage management, and drought mitigation strategies, which would help producers better cope with extreme weather events and protect long-term productivity [16]. Expanding processing capacity could improve market access for small- and medium-scale producers and enhance competitiveness in broader regional and national markets [4] [18]. Additionally, workforce development programs, including technical training and youth engagement initiatives, are essential to address labor shortages and ensure continuity in the livestock sector [21]. Economic multipliers suggest that strategic investments in high-performing and climate-resilient sectors could yield substantial indirect benefits for local

economies, reinforcing both environmental and economic sustainability [17] [19]. Supporting value-added production, market integration, and climate resilience simultaneously can enhance both the economic and environmental sustainability of Louisiana's livestock industry [17] [19]).

5. Conclusions

Overall, the ongoing decline in cattle and beef cow inventories highlights the need for targeted interventions to maintain the viability of traditional livestock operations. The differential trends between Louisiana and Mississippi suggest that Louisiana's cattle sector may require more intensive structural support, including incentives for farm consolidation or cooperative management models, to stabilize herd sizes and maintain economic viability. Investment in local and regional processing infrastructure is also critical since bottlenecks in slaughter and distribution limit the state's ability to capture value from livestock production, constraining rural economic growth and employment opportunities. Emerging growth in poultry farming also presents an opportunity to reshape the state's livestock economy toward higher-value, vertically integrated systems. Policies that promote investment in poultry processing, supply chain development, and direct-to-consumer marketing could amplify economic returns and create jobs in rural communities. Based on this, empirical trends suggest specific policy priorities that is, incentivizing resilience and adaptation in traditional cattle operations, investing in processing and market infrastructure, supporting labor and skills development, and fostering growth in high-value and climate-resilient livestock sectors.

Strategic action in these areas can strengthen the state's rural economy, improve food system stability, and ensure the long-term viability of Louisiana's livestock industry. Policies that integrate resilience, market development, and workforce support can strengthen Louisiana's livestock industry, improve food system stability, and bolster rural economic vitality. The livestock inventory figures analyzed in this study are based on survey responses and administrative datasets, which could be affected by under-reporting or inaccuracies from producers. Furthermore, no on-site visits to individual farms were conducted to verify the data, restricting the capacity to confirm parish-level estimates. Consequently, although the data offer a trustworthy overview of general trends, minor discrepancies at the local level may be present. Nonetheless, Louisiana's livestock industry stands at a critical juncture, confronting structural hurdles while also presenting avenues for growth. Implementing policies that promote climate-resilient practices, bolster local and regional processing infrastructure, and develop a skilled workforce can improve both sustainability and economic contributions. Strategic support for diversification, value-added production, and expanded market access will reinforce rural livelihoods and strengthen the state's agricultural economy, helping ensure that Louisiana's livestock sector remains robust and adaptable amid environmental and market challenges.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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