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Abstract

This study provides a comprehensive economic assessment of Oklahoma's goat industry, an expanding yet empirically understudied sector in regional agrifood value chains. Utilizing 2022 USDA Census of Agriculture production data scaled to 2026 dollars (\$9.72 million direct output) and an IMPLAN input-output framework, the analysis separates upstream primary production from downstream value-added processing to quantify sector-specific employment, labor income, value-added, and output contributions.

Combined results show that after removing overlapping direct effects to prevent double-counting, the state's goat industry supports approximately 181 annual-average jobs, \$2.33 million in labor income, \$10.71 million in value-added, and \$14.93 million in total industry output. This network structure implies an output multiplier of 1.53, meaning each \$1 of direct goat output generates an additional \$0.53 of economic activity statewide. Structural comparison reveals sharp divergences between the two segments.

The upstream component exhibits a localized, primary-production-dependent structure with minor supplier spillovers, capturing 93% of its total output within the primary agriculture sector. Conversely, the downstream component displays significantly stronger supply-chain interactions, generating \$0.45 in indirect output for every dollar of direct output, driven primarily by animal slaughtering and meat processing carcasses. These findings highlight that the most impactful opportunities for amplifying the industry's economic footprint and rural development potential reside in expanding local processing infrastructure and value-added market channels rather than primary herd expansion alone.

1. Introduction

Goat production has become one of the faster-growing small-ruminant enterprises in the United States, yet it remains understudied from an economic perspective. Studies emphasize both the nutritional and therapeutic benefits of goat meat and milk, as well as the industry's role in livelihood diversification (Anaeto et al., 2010; Mazhangara et al., 2019; B. A. Miller & Lu, 2019). Extension and producer-oriented guidance further highlight growing interest in meat-goat enterprises across the United States, including the Southern Plains, where producers are turning to goats as complementary enterprises suited to marginal land and niche markets (Hart et al., 2019; Jones & Raper, 2017; Morand-Fehr et al., 2004). Jones and Raper (2017) show how seasonal price patterns and holiday demand can inform breeding, kidding, and marketing decisions for meat goat producers in major U.S. goat markets. More broadly, Hart et al. (2019) describe strong growth potential for the U.S. goat industry while noting constraints, including access to local markets and abattoirs, parasite pressure, and feed costs.

Although studies on goats span animal science, production systems, and market behavior, the existing literature provides little guidance on the economic role of the goat industry within specific U.S. regions. Studies have been conducted on the biological, nutritional, and management dimensions of goat production (Anaeto et al., 2010; Mazhangara et al., 2019; B. A. Miller & Lu, 2019; Morand-Fehr et al., 2004). Further, extension and producer-focused publications outline practical considerations for herd management, breeding decisions, marketing challenges, and price seasonality (Bactawar, 2019; Hart et al., 2019; Jones & Raper, 2017). Studies on consumer preferences and goat-meat markets document ethnic demand patterns, preferences for freshness, and other factors influencing willingness to pay (Basen et al., 2025; De Silva et al., 2024; Ekanem et al., 2013; Hambaryan et al., 2024; Ibrahim, 2011; Ibrahim et al., 2017, 2018; Knight et al., 2006; Ngomane et al., 2022; Worley et al., 2004).

However, to our knowledge, few studies have evaluated how the goat industry interacts with a state's broader economy, through employment, value added, input purchases, or processing activity. This absence is particularly important for Oklahoma, which is among the nation's leading goat-producing states, yet there is no empirical evidence to quantify the economic footprint or supply-chain linkages of its goat industry. Hence, this study aims to bridge the gap in the literature by evaluating the economic contributions, structural linkages, and multiplier effects of Oklahoma's goat industry and how these effects differ between upstream production activities and downstream value-added operations.

Although research on goat meat in the United States has grown steadily, it remains concentrated in consumer preference and marketing studies rather than in regional economic analysis. Earlier work documented low mainstream familiarity, ethnic-driven demand, and the importance of freshness, slaughter practices, and consumers' socio-economic characteristics (Ibrahim, 2011; Knight et al., 2006; Rhee et al., 2003; Worley et al., 2004). Subsequent studies expanded on these insights by examining willingness to pay, product attributes, and the market barriers producers face (Ekanem et al., 2013; Harrison et al., n.d.; Ibrahim et al., 2017, 2018; Nyaupane et al., 2016; Qushim et al., 2016). More recent work shows shifting consumer motivations toward health, sustainability, and production practices, with mixed evidence on organic premiums and attribute preferences across demographic groups (Basen et al., 2025; De

Silva et al., 2024; Hambaryan et al., 2024; Khanal et al., 2025; Ngomane et al., 2022). While this literature provides a robust understanding of demand-side dynamics, it offers little evidence on the goat industry's economic contribution, supply-chain linkages, or state-level multiplier effects. This gap in literature is especially salient for Oklahoma, a major goat-producing state for which the industry's broader economic footprint has not been empirically assessed.

This paper provides a comprehensive economic assessment of Oklahoma's goat industry using an input–output framework. By separating upstream production activities from downstream processing and value-added operations, the study quantifies the contributions of each segment to employment, labor income, value added, and total output within the state economy. The analysis estimates upstream indirect and induced effects and identifies downstream forward linkages that connect goat output to processing and related industries. Beyond generating baseline economic contribution estimates, the study offers a structural interpretation of the industry's position in Oklahoma's agrifood value chain. In doing so, the paper fills a critical gap in the literature and provides evidence to inform state-level decisions on agricultural diversification, rural development, and processing infrastructure.

The remainder of the paper proceeds as follows. The Data section describes the dataset used in the study. The Empirical Methods section introduces the model specification and the linkage measures employed. The Results and Discussion section presents the estimated economic contributions and examines the associated structural linkages. The paper concludes by outlining policy and development implications for Oklahoma's agricultural sector.

2. Data

The estimation of Oklahoma's goat industry contribution relies on state-level production data from the *2022 Census of Agriculture* compiled by the U.S. Department of Agriculture's National Agricultural Statistics Service (USDA NASS, 2024). The Census reports \$9.943 million in goat and kid sales for 2022, which we use as the industry's annual value of production. In total, 2,650 farms sold 43,350 head of goats and kids, implying an average sales value of about \$230 per head. This sales value provides the direct output basis for modeling the goat industry's economic contribution in IMPLAN. Goat sales totaled \$9.943 million in 2022 nominal dollars. After IMPLAN applied the goat-sector output deflator to express the value in 2026 dollars, the sales value was adjusted to \$9.723 million.

3. Empirical Model

This study evaluates the economic structure of the Oklahoma goat industry using an input–output (I–O) framework that captures both backward, or upstream, and forward, or downstream, interindustry linkages. The analysis combines 2022 goat production data with IMPLAN regional accounts for Oklahoma using the 2022 IMPLAN Data Year. Monetary results are reported in 2026 dollars. The I–O framework follows the standard Leontief demand-driven model for backward linkages and the Ghosh supply-driven model for forward linkages (Ghosh, 1958a; Leontief, 1936; R. E. Miller & Blair, 2022). The empirical implementation uses IMPLAN's industry contribution and downstream contribution framework to estimate the annual economic contribution associated with existing goat production and its linked upstream and downstream

value-chain relationships (IMPLAN, 2025a, 2025b).

3.1. Backward (Demand-Driven) Linkages

Backward linkages are estimated using the demand-driven Leontief model, which traces the upstream production required to satisfy a given level of final demand. Let z_{ij} denote the value of intermediate inputs purchased by sector j from sector i , and let x_j represent the total output of sector j . Technical or direct coefficients are defined as:

$$a_{ij} = \frac{z_{ij}}{x_j} \quad (1)$$

where a_{ij} measures the value of inputs from sector i required per unit of output in sector j . Let $A = [a_{ij}]$ denote the matrix of technical coefficients, x the vector of total industry output, and y the vector of final demand. Within IMPLAN, the matrix of technical coefficients A is derived from industry production functions that specify the dollar value of intermediate inputs required per dollar of output. The demand-driven model is expressed as:

$$x = Ax + y \quad (2)$$

$$x = (I - A)^{-1}y \quad (3)$$

where $L = (I - A)^{-1}$ is the Leontief inverse. Each element l_{ij} measures the total (direct and indirect) increase in output of sector i required to satisfy a one-unit increase in final demand for sector j . In this study, the Leontief inverse is used to quantify upstream economic activity supported by goat production, including purchases from feed manufacturing, veterinary services, transportation, utilities, and related industries. Because the objective is to measure the contribution of an existing industry rather than the effect of a new exogenous shock, the model is implemented as an industry contribution analysis in IMPLAN, with direct output specified using the Census of Agriculture goat and kid sales value.

3.2. Forward (Supply-Driven) Linkages

To evaluate downstream linkages, the study uses a supply-driven Ghosh model, which traces how an industry's output is allocated to purchasing industries. Whereas the Leontief model is based on fixed input coefficients, the Ghosh model is based on fixed output-allocation coefficients (Ghosh, 1958b; R. E. Miller & Blair, 2022). Direct output-allocation coefficients are defined as:

$$b_{ij} = \frac{z_{ij}}{x_i} \quad (4)$$

where b_{ij} represents the share of sector i 's output sold to sector j . Let $B = [b_{ij}]$ denote the matrix of output coefficients and let v represent the vector of primary inputs (value added). The supply-driven model is expressed as:

$$x' = x'B + v' \quad (5)$$

$$x' = v'(I - B)^{-1} \quad (6)$$

where $G = (I - B)^{-1}$ is the Ghosh inverse. Each element g_{ij} measures the total (direct and indirect) increase in output of sector j associated with a one-unit increase in primary inputs to sector i . The forward-linkage estimates are implemented using IMPLAN's Downstream Industry Contribution framework, which estimates the annual contribution associated with the downstream value chain of the industry production being analyzed (IMPLAN, 2025a, 2025b).

The results should therefore be interpreted as describing the economic contribution and interindustry linkage structure associated with Oklahoma goat production. Backward-linkage results measure the extent to which goat production is embedded in upstream supply chains through input purchases, while forward-linkage results measure the extent to which downstream purchaser industries are linked to goat output through fixed output-allocation relationships. Because the supply-driven model assumes stable output distribution patterns, the downstream results are best interpreted as forward-linkage contribution estimates associated with existing goat-sector output, rather than as a conventional final-demand shock (Dietzenbacher, 1997; Ghosh, 1958a; IMPLAN, 2025b; R. E. Miller & Blair, 2022).

4. Results and Discussion

4.1. Upstream Economic Contribution

The upstream segment of Oklahoma's goat industry, comprising primary goat production and closely related input activities, generates a measurable contribution to the state's economy. The total economic contribution of this segment was estimated at 170 jobs, \$1.80 million in labor income, \$9.99 million in value added, and \$10.51 million in total industry output, as shown in Table 1.

Table 1: Economic Contribution of Oklahoma's Goat Industry (Upstream Segment 2026\$)

Impact Type	Employment	Labor Income (\$)	Value Added (\$)	Output (\$)
Direct	166.3	\$1,589,909.21	\$9,559,694.57	\$9,723,337.12
Indirect	0.36	\$16,459.95	\$27,364.63	\$79,392.88
Induced	3.55	\$190,113.07	\$406,641.28	\$710,127.80
Total	170.22	\$1,796,482.23	\$9,993,700.48	\$10,512,857.80

Note. Employment represents IMPLAN annual-average jobs supported, including full-time, part-time, seasonal, and proprietor jobs; it is not a full-time-equivalent measure. Labor income includes employee compensation and proprietor income. Value added corresponds to the contribution to Gross State Product (GSP), and output represents total industry sales or production value. Estimates are reported in 2026 dollars and reflect state-level results.

The direct effect estimates capture economic activity within Oklahoma's goat industry itself. Using 2022 production data, the model estimates direct output of approximately \$9.72 million in 2026 dollars, supporting 166 annual-average jobs and \$1.59 million in labor income. Direct value added is estimated at \$9.56 million, or about 98 percent of direct output, indicating that a large share of the industry's output remains as value added rather than being absorbed by intermediate input purchases. This pattern is broadly consistent with evidence that many meat goat systems rely heavily on forage while still incurring meaningful purchased operating costs for feed, animal health, labor, and marketing (Coffey, 2006; Hart et al., 2019; Lutes, 2025). Consequently, the goat industry's direct contribution is large relative to its modest indirect and induced spillovers.

The indirect effects, which capture inter-industry linkages through purchases of intermediate inputs such as feed, veterinary services, fuel, and transportation, were minimal, amounting to less than one annual-average job (0.36 jobs), \$16,460 in labor income, and \$79,393 in output. The induced effects, generated by household spending of labor income earned in the goat industry and industries from which the goat industry purchases inputs, supported approximately 4 jobs, \$190,113 in labor income, and \$710,128 in output. These findings highlight the goat industry's direct production as the dominant source of economic contribution, with relatively minor multiplier effects through supply-chain and consumption linkages.

Industry-Level Distribution of Upstream Contribution

The industry-level distribution of effects further illustrates Oklahoma's goat industry's concentrated structure. As shown in Table 2, nearly all output effects occur within *the Animal production except cattle, poultry, and eggs* industry, which accounts for \$9.72 million of the total \$10.51 million in upstream economic activity. Minor linkages appear in industries such as *Owner-occupied housing, Hospitals, Petroleum refineries, Limited- and Full-service restaurants, and Offices of physicians*, reflecting induced household spending and limited local supply-chain purchases.

When aggregated by sector, as shown in Table 5 in the Appendix, the *Agriculture, Forestry, Fishing, and Hunting* sector accounts for about 93 percent of the goat industry's total contribution to upstream industries. This indicates that the goat industry's economic footprint is highly concentrated within primary agriculture, generating minimal spillovers to non-agricultural sectors. Although the *Agriculture, Forestry, Fishing, and Hunting* sector captures most of the upstream contribution, goat production itself represents only about 0.10 percent of that sector's total output in Oklahoma. Contributions to all other broad sectors, relative to their output, are negligible and round to zero. This suggests that, despite the concentration of effects within agriculture, the relative magnitude of the goat industry's upstream contribution remains very small compared with the overall size of the state's agricultural sector.

Table 2: Top Fifteen Industries Affected by the Goat Industry's Upstream Contribution (2026\$)

Industry	Industry Total Output	Impact Output	% of Total Industry Output
Animal production, except cattle and poultry and eggs	\$1,550,118,759.99	\$9,723,337.12	0.63%
Owner-occupied housing	\$17,547,472,146.96	\$129,903.28	0.00%
Hospitals	\$11,085,755,262.13	\$52,709.46	0.00%
Petroleum refineries	\$16,533,814,628.28	\$24,771.76	0.00%
Limited-service restaurants	\$7,528,811,901.95	\$23,798.76	0.00%
Offices of physicians	\$5,184,415,819.45	\$20,506.58	0.00%
Full-service restaurants	\$5,676,505,933.03	\$19,954.25	0.00%
Other local government enterprises	\$17,794,421,518.00	\$19,703.69	0.00%
Oil and gas extraction	\$63,848,849,637.11	\$19,079.16	0.00%
Monetary authorities and depository credit intermediation	\$7,557,543,965.22	\$17,613.25	0.00%
Other animal food manufacturing	\$1,307,223,471.51	\$16,976.44	0.00%
Other real estate	\$15,994,115,603.22	\$16,853.77	0.00%
Wholesale - Other nondurable goods merchant wholesalers	\$4,710,982,645.92	\$15,888.19	0.00%
Retail - Motor vehicle and parts dealers	\$4,639,578,995.76	\$15,749.28	0.00%
Retail - General merchandise stores	\$3,422,703,316.42	\$11,421.93	0.00%

Note. Industry output reflects total statewide production in each sector; impact output represents the portion attributable to the goat industry's upstream activities in 2022. All values are in 2026 U.S. dollars.

4.2. Downstream Economic Contribution

As reported in Table 3, using 2022 production data, the downstream segment of Oklahoma's goat industry generated an estimated 177 jobs, \$2.12 million in labor income, \$10.3 million in value added, and \$14.14 million in total output in 2026 dollars. The direct effect reflects the goat industry itself and accounted for 166 jobs, \$1.59 million in labor income, and \$9.72 million in output. The indirect effects were relatively larger than in the upstream segment, supporting about 11 jobs, \$0.53 million in labor income, and \$4.41 million in output, because in the forward linkage framework, they represent downstream industries that purchase goat products as inputs to production rather than upstream suppliers. No induced effects were reported

in the forward linkage analysis because IMPLAN does not estimate an additional round of household spending, so no separate induced effect is calculated.

Table 3: Economic Contribution of Oklahoma's Goat Industry (*Downstream Segment 2026\$*)

Impact Type	Employment	Labor Income	Value Added	Output
Direct	166.3	\$1,589,909.21	\$9,559,694.57	\$9,723,337.12
Indirect	10.84	\$530,811.09	\$719,731.28	\$4,413,356.03
Induced	0	\$0.00	\$0.00	\$0.00
Total	177.14	\$2,120,720.30	\$10,279,425.86	\$14,136,693.15

Note. Employment represents IMPLAN annual-average jobs supported, including full-time, part-time, seasonal, and proprietor jobs; it is not a full-time-equivalent measure. Labor income includes employee compensation and proprietor income. Value added corresponds to the contribution to Gross State Product (GSP), and output represents total industry sales or production value. Estimates are reported in 2026 dollars and reflect state-level results.

Industry-Level Distribution of Downstream Contribution

The industry-level distribution of the downstream goat industry shows a broader set of economic linkages than observed in the upstream segment. The direct effect is the goat industry itself, while the forward indirect effects identify downstream industries that purchase goat output as an input. As presented in Table 4, most output effects occur within the *Animal production, except cattle and poultry and eggs* industry (\$9.74 million). Together, the *Animal, except poultry, slaughtering* industry (\$2.61 million) and the *Meat processed from carcasses* industry (\$1.19 million) account for about 86% of downstream indirect output, underscoring the central role of slaughter and meat processing in converting primary goat production into marketable products.

Table 4: Top Fifteen Industries Affected by the Goat Industry's Downstream Contribution (2026\$)

Industry	Industry Total Output	Impact Output	% of Total Industry Output
Animal production, except cattle and poultry and eggs	\$1,550,118,759.99	\$9,742,756.71	0.63%
Animal, except poultry, slaughtering	\$2,664,270,351.02	\$2,611,559.34	0.10%
Meat processed from carcasses	\$2,704,987,425.50	\$1,193,981.64	0.04%
Limited-service restaurants	\$7,528,811,901.95	\$136,121.19	0.00%
Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	\$4,576,374,000.00	\$133,789.48	0.00%

Industry	Industry Total Output	Impact Output	% of Total Industry Output
Full-service restaurants	\$5,676,505,933.03	\$64,516.21	0.00%
Dog and cat food manufacturing	\$1,004,281,345.16	\$33,842.03	0.00%
Scientific research and development services	\$5,488,335,073.31	\$24,501.70	0.00%
All other food manufacturing	\$177,838,593.17	\$19,530.40	0.01%
Tire manufacturing	\$1,785,292,798.76	\$17,529.01	0.00%
Support activities for agriculture and forestry	\$349,182,032.24	\$17,177.07	0.00%
Grain farming	\$863,788,994.49	\$14,005.66	0.00%
Poultry processing	\$1,381,991,783.61	\$13,767.46	0.00%
Other animal food manufacturing	\$1,307,223,471.51	\$11,088.88	0.00%
Other amusement and recreation industries	\$498,335,927.81	\$9,980.78	0.00%

Note. Industry output represents statewide production, while impact output measures the portion attributable to downstream goat industry activities in 2022. All figures are in 2026 U.S. dollars.

Industries in which secondary linkages appear include *Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming; Limited- and Full-service restaurants; and Dog and Cat food manufacturing*. Smaller effects extend to *tire manufacturing, grain farming, and poultry processing*, indicating that goat-based products interact modestly with other food and material supply chains. In addition, the goat industry contributes marginally to *support activities for agriculture and forestry, and other amusement and recreation industries*. These patterns differ from the upstream results in that the downstream segment generates a greater proportion of indirect activity relative to direct output.

Table 6 in the Appendix shows the distribution of downstream contribution across sectors. The *Agriculture, Forestry, Fishing, and Hunting* sector accounts for the largest share of total downstream output. The *Manufacturing* sector ranks second, with \$3.92 million in output effects, underscoring the critical role of meat processing, packaging, and secondary food manufacturing in transforming raw goat products into consumable goods. Minor but measurable linkages occur in *Accommodation and Food Services, Health Care and Social Assistance, and Professional, Scientific, and Technical Services*, which collectively reflect downstream purchaser industries linked to the use and transformation of goat output. The small magnitude of these effects relative to the sectoral totals, most of which round to 0.00%, indicates that while goat processing engages a broad network of downstream industries, its overall scale remains limited within Oklahoma's economic base.

4.3. Total Economic Contribution of Oklahoma's Goat Industry

We combined the upstream and downstream contributions of Oklahoma's goat industry to obtain the total economic contribution of the goat industry. To prevent double counting, the direct output of the downstream industry contribution analysis (forward linkage) was excluded from the combined total, since the direct goat industry output is already reflected in the upstream industry contribution analysis (backward linkage). Likewise, no induced effects were estimated for the downstream segment as discussed previously (see Section 4.2). Using 2022 production data, the goat industry supported approximately 181 jobs, \$2.33 million in labor income, \$10.71 million in value added, and \$14.93 million in total output, reported in 2026 dollars. This result indicates that for every \$1 of direct output by the goat industry, an additional \$0.53 in economic activity is generated across Oklahoma's economy through the network of supporting upstream and downstream industries.

4.4. Comparative Discussion: Upstream vs. Downstream Structure

Comparison of the two segments reveals meaningful structural differences. The upstream component is characterized by a narrow concentration of effects within primary agriculture, limited indirect linkages, and moderate induced effects through household spending. In contrast, the downstream component exhibits stronger supply-chain interactions and a greater indirect-to-direct output ratio. Specifically, for every dollar of direct output in the downstream segment, an additional \$0.45 in indirect output is generated across Oklahoma's economy, compared with only about \$0.008 for the upstream segment. This divergence indicates that value-added activities, such as slaughtering, meat processing, and product distribution, amplify economic interdependencies and contribute to greater diversification within Oklahoma's agrifood system.

Both the labor income and value-added generated in the upstream industry are lower than in the downstream segment. Further, the *Animal production, except cattle and poultry and eggs* industry dominates both segments and captures the bulk of the direct effect of the goat industry. The structural concentration differs notably between the two. In the upstream segment, approximately 93 percent of total output is captured by the *Animal Production, except cattle and poultry and eggs* industry, indicating a highly localized and primary-production-dependent structure. However, this industry accounts for a relatively lower proportion (about 69 percent) of total output in the downstream industry, where processing and distribution activities diversify the effect across a wider range of industries.

Moreover, the composition of the top five industries, excluding *Animal production, except cattle and poultry and eggs*, differs markedly between the upstream and downstream segments. In the upstream segment, the leading industries are *Owner-Occupied Housing*, *Hospitals*, *Petroleum refineries*, *Limited-service restaurants*, and *Offices of physicians*, which largely reflect household-induced spending and upstream input demand. By contrast, the downstream segment is led by *Animal, except poultry*, *Slaughtering, Meat Processed from Carcasses*, *Limited-service restaurants*, *Beef Cattle Ranching and Farming (including feedlots and dual-purpose operations)*, and *Full-service restaurants*, indicating stronger industrial processing, value addition, and product transformation linkages.

Additionally, the goat industry's contribution relative to each industry's total output is minimal. When aggregated by sector, the goat industry contributes about 0.1% of the Agriculture, Forestry, Fishing, and Hunting sector's total output through forward and backward linkages, and less than that to other downstream and upstream sectors relative to each sector's total output.

5. Conclusion and Policy Implications

The Oklahoma goat industry makes a modest but measurable contribution to the state economy. After combining upstream and downstream linkages and removing double-counting of the direct effect, the industry supports about 181 jobs, \$2.33 million in labor income, \$10.71 million in value added, and \$14.93 million in total output, reported in 2026 dollars. The results show a clear structural contrast between the two segments of the industry. Upstream effects are concentrated in primary animal production and generate limited supplier spillovers, whereas downstream linkages extend more broadly into animal slaughtering, meat processing, food manufacturing, and related purchaser industries. This pattern suggests that the strongest opportunities for expanding the goat industry's economic role lie in strengthening local processing, distribution, and other value-added channels rather than in primary production alone.

From a policy perspective, the findings support targeted efforts to improve processing access, local market coordination, and value-added product development in Oklahoma's goat industry. Future research should examine county-level variation, market access, and processing constraints to better identify where new investment would have the greatest regional payoff.

References

- Anaeto, M., Adeyeye, J., Chioma, G., Olarinmoye, A., & Tayo, G. (2010). Goat products: Meeting the challenges of human health and nutrition. *Agriculture and Biology Journal of North America*, 1(6), 1231–1236. <https://doi.org/10.5251/abjna.2010.1.6.1231.1236>
- Bactawar, B. (2019, January 14). *Is there a Potential for Growth of the Goat Industry in Florida?* UF/IFAS Duval County Extension Service. <https://extadmin.ifas.ufl.edu/nflag/livestock/goats/potential-for-growth/>
- Basen, W., Lai, J., Kassas, B., & Wallau, M. (2025). Investigating trends in consumer preferences and willingness to pay for lamb and goat meat: A case study from Florida. *Agribusiness*, 41(1), 25–43. <https://doi.org/10.1002/agr.21873>
- Coffey, L. (2006). Meat Goats: Sustainable Production. *National Center for Appropriate Technology, ATTRA - National Sustainable Agriculture Information Service*.
- De Silva, N., Whittaker, W., & Chidmi, B. (2024). Goat Meat Consumption in Oklahoma: A Quantitative Assessment of Potential Consumer Demand. *Journal of Food Distribution Research*, 55(1), 1–14.
- Dietzenbacher, E. (1997). In Vindication of the Ghosh Model: A Reinterpretation as a Price Model. *Journal of Regional Science*, 37(4), 629–651. <https://doi.org/10.1111/0022-4146.00073>
- Ekanem, E., Mafuyai-Ekanem, M., Tagegne, F., Singh, S., & Favors, D. (2013). Goat Meat Consumer Preference: Implications for Goat Meat Marketing in Metropolitan, Nashville, Tennessee Area. *Journal of Food Distribution Research*.
- Ghosh, A. (1958a). Input-Output Approach in an Allocation System. *Economica*, 25(97), 58–64. <https://doi.org/10.2307/2550694>
- Ghosh, A. (1958b). Input-Output Approach in an Allocation System. *Economica*, 25(97), 58–64. <https://doi.org/10.2307/2550694>
- Hambaryan, M., Lai, J., & Kassas, B. (2024). Informational Nudges to Promote Preferences for Goat Meat. *Journal of Agricultural and Applied Economics*, 56(3), 373–388. <https://doi.org/10.1017/aae.2024.15>
- Harrison, R. W., Hill, J. I., Gillespie, J. M., & McMillin, K. W. (n.d.). *Consumers' Preference for Goat Meat in the United States*.
- Hart, S., Merkel, R., & Gipson, T. (2019). Current Situation and Future Prospects of the US Goat Industry. *Professional Agricultural Workers Journal*, 6(2), 25.
- Ibrahim, M. (2011). Consumer Willingness to Pay a Premium for Halal Goat Meat: A Case from Atlanta, Georgia. *Journal of Food Distribution Research*.
- Ibrahim, M., Onyango, B., Pattanaik, N., & Liu, X. (2018). Current Trends, U.S. Immigration Policies, and Marketing Strategies for Goat Meat. *Journal of Food Distribution Research*, 49(1).
- Ibrahim, M., Pattanaik, N., Onyango, B., & Liu, X. (2017). Factors Influencing Potential Demand for Goat Meat in Georgia. *Journal of Food Distribution Research*, 48(1).
- IMPLAN. (2025a, August 28). *IMPLAN's Suite of Forward Linkage Capabilities*. <https://implan.com/forward-linkage-suite/>
- IMPLAN. (2025b, September 3). *Forward Thinking: A New Dimension in Impact Analysis*. IMPLAN - Support. <https://support.implan.com/hc/en-us/articles/40679015866267-Forward-Thinking-A-New-Dimension-in-Impact-Analysis>
- Jones, J. J., & Raper, K. C. (2017). *Meat Goat Marketing and Price Seasonality*. OSU Extension.

- Khanal, B., Dhoubhadel, S. P., & Nayga, R. M. (2025). The Impacts of Health and Environmental Information Nudges on Meat Choices: Where Does Goat Meat Fit? *Agribusiness*, agr.22021. <https://doi.org/10.1002/agr.22021>
- Knight, E. P., House, L., Nelson, M. C., & Degner, R. L. (2006). An Evaluation of Consumer Preferences Regarding Goat Meat in the South. *Journal of Food Distribution Research*.
- Leontief, W. W. (1936). Quantitative Input and Output Relations in the Economic Systems of the United States. *The Review of Economics and Statistics*, 18(3), 105–125. <https://doi.org/10.2307/1927837>
- Lutes, J. (2025). Meat goat planning budget. *University of Missouri Extension*.
- Mazhangara, I. R., Chivandi, E., Mupangwa, J. F., & Muchenje, V. (2019). The Potential of Goat Meat in the Red Meat Industry. *Sustainability*, 11(13), 3671. <https://doi.org/10.3390/su11133671>
- Miller, B. A., & Lu, C. D. (2019). Current status of global dairy goat production: An overview. *Asian-Australasian Journal of Animal Sciences*, 32(8), 1219–1232. <https://doi.org/10.5713/ajas.19.0253>
- Miller, R. E., & Blair, P. D. (2022). *Input-Output Analysis: Foundations and Extensions* (3rd ed.). Cambridge University Press. <https://doi.org/10.1017/9781108676212>
- Morand-Fehr, P., Boutonnet, J. P., Devendra, C., Dubeuf, J. P., Haenlein, G. F. W., Holst, P., Mowlem, L., & Capote, J. (2004). Strategy for goat farming in the 21st century. *Small Ruminant Research*, 51(2), 175–183. <https://doi.org/10.1016/j.smallrumres.2003.08.013>
- Ngomane, M., Tsvakirai, C. Z., & Mlambo, V. (2022). Improving the marketing of goat meat to youths in South Africa. *Small Ruminant Research*, 214, 106760. <https://doi.org/10.1016/j.smallrumres.2022.106760>
- Nyaupane, N., Gillespie, J., & McMillin, K. (2016). The Marketing of Meat Goats in the US: What, Where, and When? *Journal of Food Distribution Research*.
- Qushim, B., Gillespie, J., & McMILLIN, K. (2016). MEAT GOAT ENTERPRISE EFFICIENCY ANALYSIS IN THE SOUTHEASTERN UNITED STATES. *Journal of Agricultural and Applied Economics*, 48(1), 52–72. <https://doi.org/10.1017/aae.2016.1>
- Rhee, K. S., Myers, C. E., & Waldron, D. F. (2003). Consumer sensory evaluation of plain and seasoned goat meat and beef products. *Meat Science*, 65(2), 785–789. [https://doi.org/10.1016/S0309-1740\(02\)00283-8](https://doi.org/10.1016/S0309-1740(02)00283-8)
- USDA NASS. (2024). *2022 Census of Agriculture-Oklahoma State and County Data* (AC-22-A-36; Geographic Area Series). The U.S. Department of Agriculture’s National Agricultural Statistics Service (NASS). https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_1_State_Level/Oklahoma/okv1.pdf
- Worley, C. T., Ellerman, J., Mangione, D., West, T., & Yang, Y. (2004). Meat-Goat Market Analysis: A Pilot Study of the Somali Market in Columbus, OH. *Journal of Food Distribution Research*.

Appendix

Table 5: Upstream Contribution of the Goat Industry by Sector, Oklahoma (2026\$)

Sector	Sector Total Output	Impact Output	% of Total Sector Output
Agriculture, Forestry, Fishing and Hunting	\$9,736,654,340.97	\$9,738,952.70	0.10%
Health Care and Social Assistance	\$28,914,016,629.50	\$114,558.21	0.00%
Real Estate and Rental and Leasing	\$44,055,291,527.06	\$165,394.67	0.00%
Educational Services	\$2,105,811,736.98	\$7,333.16	0.00%
Accommodation and Food Services	\$16,900,047,263.07	\$57,309.11	0.00%
Retail Trade	\$21,995,087,052.71	\$73,539.36	0.00%
Finance and Insurance	\$25,566,871,837.62	\$65,430.90	0.00%
Other Services (except Public Administration)	\$11,039,723,592.03	\$24,934.44	0.00%
Arts, Entertainment, and Recreation	\$2,966,790,448.47	\$6,336.53	0.00%
Wholesale Trade	\$24,460,219,683.79	\$46,437.66	0.00%
Information	\$13,950,489,297.01	\$20,950.96	0.00%
Utilities	\$12,433,916,272.03	\$15,636.82	0.00%
Government Enterprises	\$20,016,475,800.62	\$22,761.95	0.00%
Administrative and Support and Waste Management and Remediation Services	\$15,027,191,095.88	\$17,080.54	0.00%
Transportation and Warehousing	\$23,120,609,209.47	\$23,650.90	0.00%
Professional, Scientific, and Technical Services	\$22,089,371,191.20	\$22,109.84	0.00%
Management of Companies and Enterprises	\$6,083,885,181.80	\$5,663.82	0.00%
Manufacturing	\$84,549,762,544.69	\$61,133.09	0.00%
Mining, Quarrying, and Oil and Gas Extraction	\$71,102,511,698.02	\$19,610.69	0.00%
Construction	\$22,944,269,746.73	\$4,032.46	0.00%

Note. Estimates represent sector output and the corresponding share attributable to the goat industry's upstream effects in 2022. Percentages are expressed relative to total statewide industry output and rounded to two decimal places.

Table 6: Downstream Contribution of the Goat Industry by Sector, Oklahoma (2026\$)

Sector	Sector Total Output	Impact Output	% of Total Sector Output
Agriculture, Forestry, Fishing and Hunting	\$9,736,654,340.97	\$9,920,644.91	0.10%
Manufacturing	\$84,549,762,544.69	\$3,923,498.00	0.00%
Accommodation and Food Services	\$16,900,047,263.07	\$211,393.49	0.00%
Arts, Entertainment, and Recreation	\$2,966,790,448.47	\$14,985.19	0.00%
Professional, Scientific, and Technical Services	\$22,089,371,191.20	\$26,939.31	0.00%
Educational Services	\$2,105,811,736.98	\$1,426.28	0.00%
Health Care and Social Assistance	\$28,914,016,629.50	\$15,017.72	0.00%
Management of Companies and Enterprises	\$6,083,885,181.80	\$1,543.82	0.00%
Real Estate and Rental and Leasing	\$44,055,291,527.06	\$7,491.00	0.00%
Administrative and Support and Waste Management and Remediation Services	\$15,027,191,095.88	\$1,880.79	0.00%
Finance and Insurance	\$25,566,871,837.62	\$3,061.73	0.00%
Wholesale Trade	\$24,460,219,683.79	\$1,830.06	0.00%
Other Services (except Public Administration)	\$11,039,723,592.03	\$763.38	0.00%
Retail Trade	\$21,995,087,052.71	\$1,144.66	0.00%
Information	\$13,950,489,297.01	\$719.49	0.00%
Government Enterprises	\$20,016,475,800.62	\$988.61	0.00%
Transportation and Warehousing	\$23,120,609,209.47	\$878.76	0.00%
Construction	\$22,944,269,746.73	\$825.90	0.00%
Utilities	\$12,433,916,272.03	\$395.51	0.00%
Mining, Quarrying, and Oil and Gas Extraction	\$71,102,511,698.02	\$1,264.53	0.00%

Note. Estimates represent sector output and the corresponding share attributable to the goat industry's downstream effects in 2022 . Percentages are expressed relative to total statewide industry output and rounded to two decimal places.



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