

Price index received in animal production in the Estate of Espírito Santo between 2000 and 2022

Edileuza Vital Galeano¹

Submission: 05/01/2024

Approval: 10/03/2024

Abstract - Prices undergo large fluctuations depending on variations in production and other market-related factors. This research aimed to develop a study of the variation in prices of animal production products in Espírito Santo. A bundle with milk, beef, pork, poultry and eggs was considered. The price index methodology was used, which are numbers that aggregate and represent the prices of a given bundle of products. The IPR ended December 2022 with an increase of 194,81%, when compared to the prices in force in January 2000. Eggs were the product that had the largest price variation, with an accumulation of 356.4%. Pork slaughter was the product with the lowest variation, accumulating a 180.8% increase and was the only one that was below the IPR at the end of the analysis period. In comparison, the IPR was above the IGPM for most of the historical series. The IPR was closer to the IPCA compared to the IGPM.

Keywords: Meat. Milk. Eggs. Supply. Inflation.

Índice de preços recebidos na produção animal do estado do espírito santo entre os anos 2000 a 2022

Resumo - Os preços sofrem grandes oscilações em função das variações na produção e outros fatores relacionados ao mercado. Este trabalho teve por objetivo elaborar um estudo da variação dos preços dos produtos da produção animal capixaba. Foi considerada uma cesta com os produtos leite, carnes bovina, suína, frango, e ovos. Foi utilizada a metodologia de índices de preços, que são números que agregam e representam os preços de determinada cesta de produtos. O IPR encerrou o mês de dezembro de 2022 com alta de 194,8%, quando comparado com os preços vigentes em janeiro de 2000. Os ovos foi o produto que teve maior variação de preços com acúmulo de alta de 356,4%. O abate de suínos foi o produto com menor variação, acumulando 180,8% de aumento e foi o único que ficou abaixo do IPR no final do período em análise. No comparativo, o IPR ficou acima do IGPM na maior parte da série histórica. O IPR esteve mais próximo do IPCA comparativamente ao IGPM.

Palavras-chave: Carnes. Leite. Ovos. Oferta. Inflação.

INTRODUCTION

Animal production in Espírito Santo is the second agricultural activity in terms of production value, only behind coffee farming. However, few economic studies on price variations in this sector are currently available.

Agricultural prices suffer large fluctuations depending on variations in production and other market-related factors. Rising food prices has a major impact on fa-

milies' purchasing power. On the other hand, if there is no recovery of prices received by rural producers, they tend to lose interest in production to avoid financial losses or seek other activities that guarantee a better economic return.

Price information and indicators make it possible to structure the planning of the various production chains that constitute domestic agribusiness, as they

1. Research and Innovation Agent in Rural Development at the Capixaba Institute for Research, Technical Assistance and Rural Extension (Incaper). Vitória, ES. edileuzagaleano@gmail.com

reflect aggregate variations, being relevant to the performance of the system and the overall result of the economy (Varaschin et al., 2004). Supply is influenced by climatic and phytosanitary factors, while demand is influenced by economic policy and by the external scenario for exports. From this perspective, having an index available that measures price variation in the first stage of agricultural and livestock production is fundamental for economic planning (Margarido, 2000; Pinatti et al., 2008).

The oldest agricultural index was initiated in 1948 by the Department of Rural Economy of the São Paulo State Department of Agriculture which, in 1968, was transformed into the Institute of Agricultural Economics (IEA). The Average Monthly Prices Received by Agricultural Producers in the State of São Paulo (PMR) included the prices of vegetable products and, in 1954, it began to include products of animal origin (Bini et al., 2013).

The use of a single national index may not portray the reality experienced in regions whose production is completely different from the national average (Souza et al., 2019). Furthermore, it can generate distorted interpretations of the price behavior received by producers in the region and lead to the disuse of the index (Ostapechen, 2021).

In Brazil, price indices are periodically calculated by some institutions, among them, the Institute of Applied Economics – IEA and the Center for Advanced Studies in Applied Economics – CEPEA of the Escola Superior de Agricultura Luiz de Queiroz – Esalq of the University of São Paulo – USP (Pinatti et al., 2008; Barros et al., 2019), the Center for Socioeconomics and Agricultural Planning – CEPA of the Agricultural Research and Rural Extension Company of Santa Catarina – Epagri (Varaschin et al., 2004). An index for the South of Minas Gerais was initiated by an extension project by the Department of Administration and Economics (DAE) of the Federal University of Lavras (UFLA) in 2016 (Caetano, 2017).

This research aimed to develop a study of the variation in prices of animal production products in Espírito Santo. Specifically, an index of prices received (IPR) by producers of animal production in Espírito Santo was constructed and a comparative study on price variations in animal production in Espírito Santo was conducted from 2000 to 2022.

PERFORMANCE OF ANIMAL PRODUCTION ACTIVITIES

In animal production, Espírito Santo has a significant production of beef and poultry and the state stands out as having the municipality with the highest egg production in Brazil. Cattle slaughter in the State has shown a downward trend over the last decade, having reached 51.8 thousand tons of carcasses in 2022. The cattle herd reached a maximum peak of 2,313 thousand heads in 2013. Due to the water crisis, the registered herd was 1,938 thousand heads in 2017 and, in 2022, the herd reached 2,231 thousand heads (PPM-IBGE, 2023; Quarterly Abate Survey-IBGE, 2023).

Milk production is another activity of great importance in agriculture in Espírito Santo. Production reached a maximum of 484 million liters in 2014. The annual Municipal Livestock Survey shows a decrease in milk production of 10.23% between 2010 and 2020. There was a 16.9% drop in milk production between 2019 and 2022 and production reached 345 million liters in 2022, which is the lowest level of production in the period evaluated (PPM-IBGE, 2023). Some factors had a direct influence on the decrease in milk production, namely, the water crisis in the period from 2014 to 2017 and the decrease in producers' profitability due to the increase in production costs, since the basis of concentrated animal feeding and fertilizers used in pastures and crops suffer great price variations as a function of the market.

The production of chicken eggs presented an excellent performance, having increased by 125.53% between 2010 and 2020. The production of chicken eggs in Espírito Santo jumped from 178.3 million dozen in 2010 to 346 million in 2022 (PPM-IBGE, 2023). This expansion in production occurred in part due to the increase in domestic consumption of eggs as a function of the reduction in the population's purchasing power, which began to choose cheaper sources of animal protein. The Quarterly Animal Slaughter Survey recorded significant growth in poultry and pork production. There was an increase of 135.51% in poultry slaughter. Poultry slaughter increased from 621 thousand tons in 2010 to 1,354 thousand tons in 2022.

Pork production recorded a growth of 70.80%. According to IBGE data, 13.8 thousand tons of pigs were slaughtered in Espírito Santo in 2010 and, in

2022, this amount reached 25 thousand. However, the historical series of pig numbers shows a drop in the number of animals.

It is important to highlight that slaughter surveys refer to those carried out by slaughterhouses based in the State and that the quantity includes animals acquired from outside the State, that is, which are not produced in Espírito Santo. On the other hand, animals produced in the state can be sold for slaughter in other states.

Given the importance of animal production in the economy of Espírito Santo, economic studies on price variations in this sector may contribute to the planning of the various production chains that constitute this sector.

MATERIALS AND METHOD

The price index methodology was used (Hoffmann, 2006), which are numbers that aggregate and represent the prices of a given bundle of products. Therefore, price indices measure the price fluctuation of different bundles of products. The IPR is a useful tool for the construction of the agricultural policy, for monitoring the sectoral conjuncture, as well as for understanding supply and demand factors in the economy and for managing rural property (Ostapechen, 2021). This author suggests that prices in Brazilian regions are different from national prices according to the product bundles and that regional indices are important when highlighting products offered regionally. Consequently, it highlights the importance of sectoral and regional price indices. To prepare the animal production index for Espírito Santo, we used the Laspeyres methodology, as for the equation below.

$$L_{(0,1)} = \frac{\sum_{i=1}^n p_1^i * q_0^i}{\sum_{i=1}^n p_0^i * q_0^i} = \sum_{i=1}^n \left(\frac{p_1^i}{p_0^i} \right) * w_0^i$$

- p is the price of the product;
- q is the quantity of the product;
- 1 indicates the current period;
- 0 indicates the previous period;
- w0 indicates participation.

The Laspeyres methodology considers prices and quantities from the initial period of the series. However, production and the market are dynamic and variations in both prices and quantities must be considered in price analyses.

Therefore, to calculate the IPR, the modified index was considered in order to use the weights of each product in each period and not just in the base period, as for Pinatti et al. (2008).

A bundle with milk, beef, pork, poultry and chicken eggs was considered. Production data were obtained from the Quarterly Survey of the Brazilian Institute of Geography and Statistics (IBGE) and prices are from the Price Survey received by rural producers of Espírito Santo, which is carried out by the Capixaba Institute for Research, Technical Assistance and Rural Extension (Incaper). The analysis covers January 2000 to December 2022, totaling 276 observation periods.

The IPR was aggregated by product group. The index was calculated based on average state prices for each product and weighted by the percentage share of the production value in the set of products considered. Thus, to construct the IPR, it was necessary to calculate the value of production and also the proportion of each product considered in the bundle.

The calculated index has a data chain characteristic, that is, the data series accumulates price variations from the base date of the index.

Hence, the indices presented in this study are those accumulated from January 2000, with this month being defined as the base and equal to 100, according to the procedure described in Varaschin et al. (2004).

The calculated IPR was compared with the Broad National Consumer Price Index (IPCA) and the General Market Price Index (IGPM).

IPR indices can measure the producer's purchasing power or income. When a value above 100 and above the IGPM or other reference index is obtained, there is evidence that the producer's income was increased and, when a value below 100 and/or below the IGPM or other reference index is obtained, there is evidence of loss of income by the producer.

RESULTS AND DISCUSSION

Previous data analysis shows that the share of the production value of cattle slaughter in all products fell from 44.1% in January 2000 to 19.3% in December 2022; the share of milk went from 17.9 % to 13.8%. The share of the production value of pig slaughtering

became more constant, going from 8.3% to 6.1%. The highlight in the growth of participation in the value of production was of poultry slaughter and chicken egg production. The share of egg production value increased from 18.2% in January 2000 to 39.2% in December 2022, while poultry slaughter increased from 11.5% to 21.7% (Figure 1).

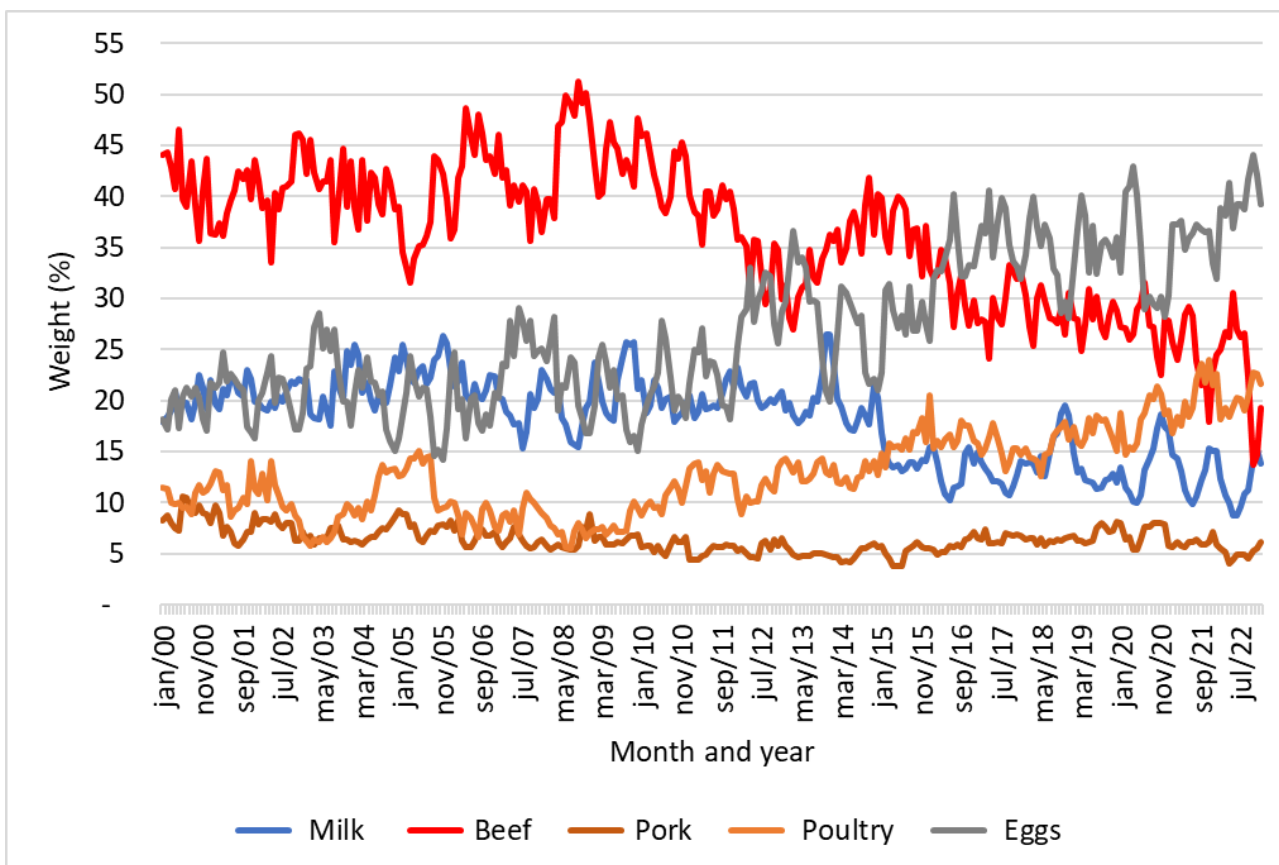


Figure 1. Evolution of the share of the value of each product in the total value of production of the bundles considered.

The visible drop in the share of the production value of cattle slaughter and milk, in the total value of the production of livestock products, as shown in figure 1, seems very impacting at first glance, as if livestock production had decreased in the state in such a way losing relevance and being replaced by other animal production activities listed in the set. In a quick analysis, livestock farming does not seem to have lost relevance in the state in terms of production, it has simply been supplanted on a much larger scale by another activity, poultry and chicken egg production.

The value of production has two basic components:

the quantity produced and the price. Observing only the extremes of the historical series, it is possible to observe that the value of production grew less for cattle and pig slaughter, in addition to milk production, compared to egg production and poultry slaughter.

Observing the accumulated price indices (Figure 2), it is noted that eggs were the product that had the greatest price variation, with an accumulated increase of 356.4%. Pig slaughter was the product with the lowest variation, accumulating a 180.8% increase, and was the only one that was below the IPR at the end of the period under analysis.

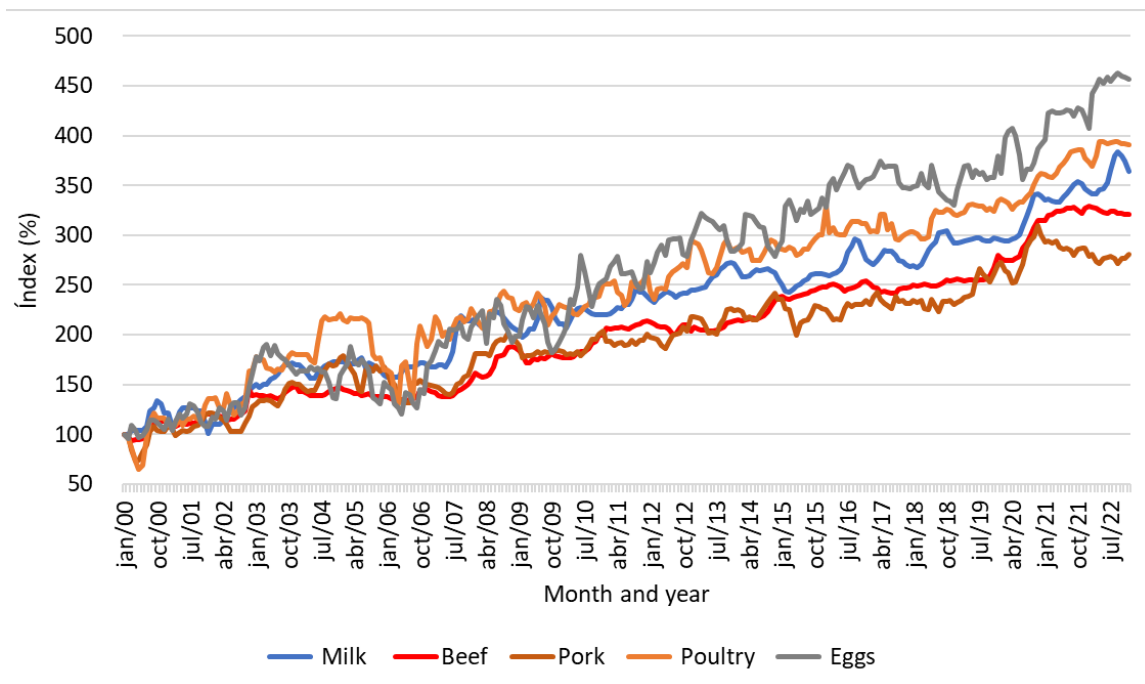


Figure 2. Evolution of indices (IPR accumulated indices - January 2000=100).

The IPR ended December 2022 with an increase of 194.8%, when compared to prices in force in January 2000 (Figure 3).

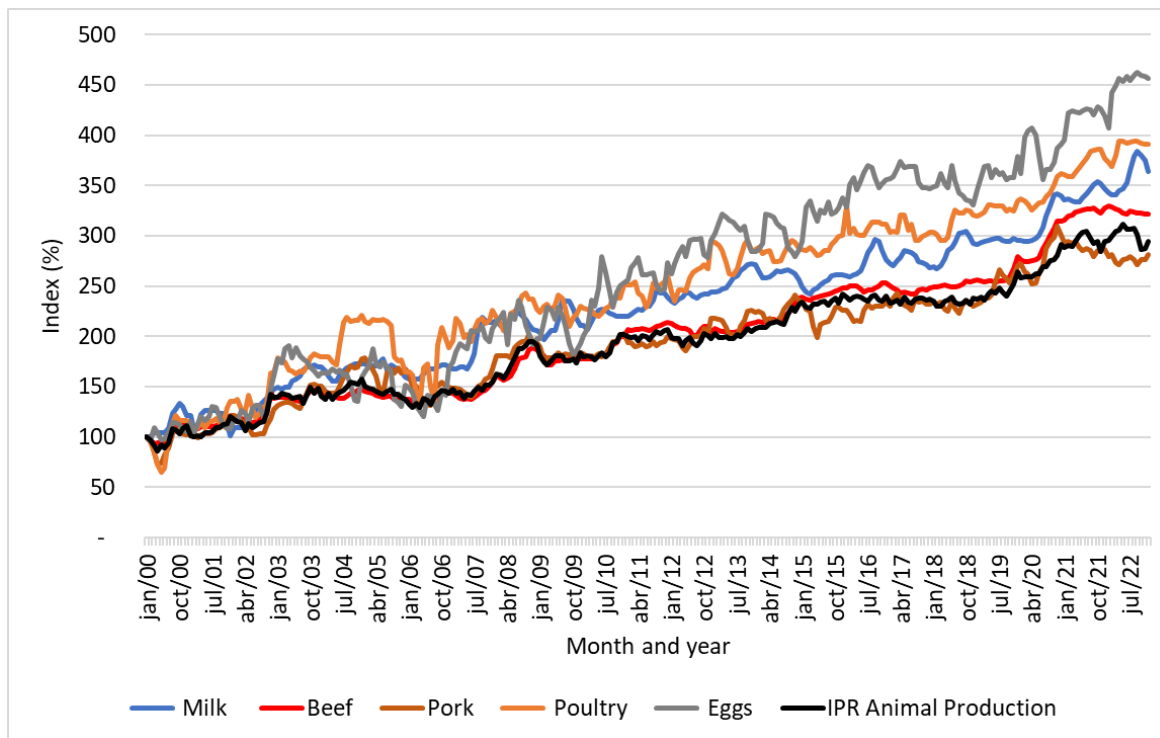


Figure 3. Evolution of indices (IPR accumulated indices January 2000=100).

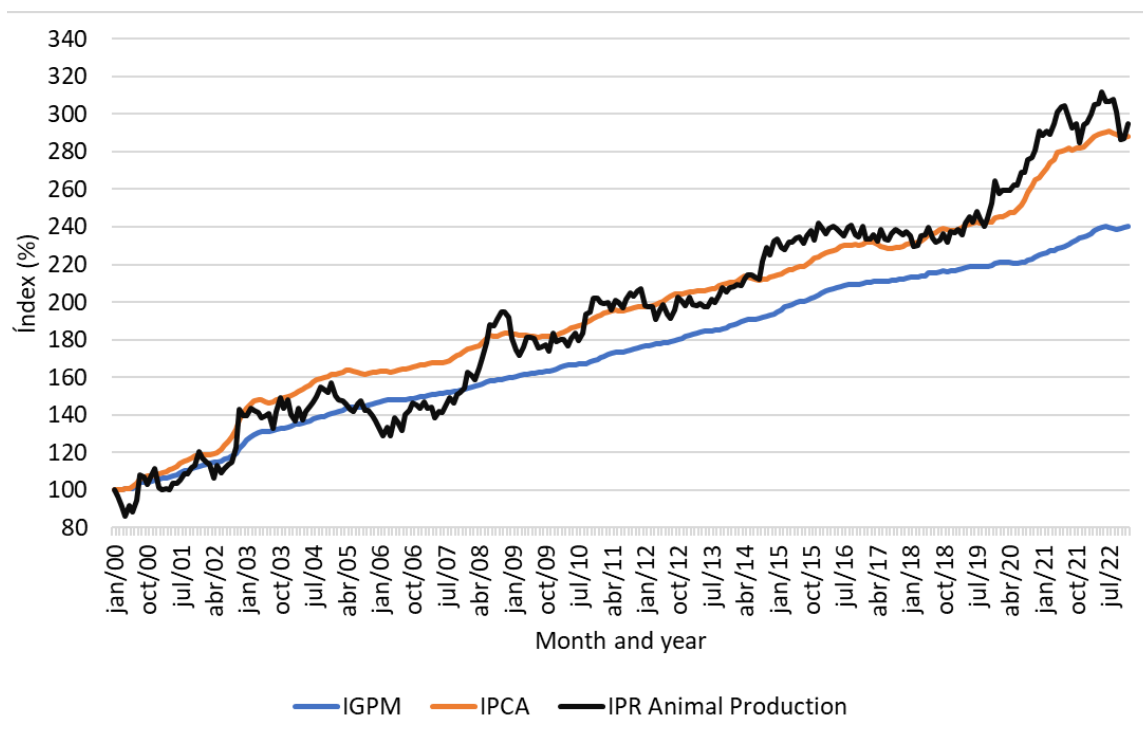


Figure 4. Evolution of indices (IPR accumulated indices January 2000=100).

The construction of indices specific to the agricultural system makes it possible to get closer to the inflationary reality of the segment, which frequently involves generalizations of aggregate indices of the economy, not reflecting the price variations faced by rural producers. The IPR has the potential to show the evolution of prices of products sold by rural producers (Varaschin et al., 2004).

The study by Bialoskorski NT and Ohira (2001) for the producer price index of the Ribeirão Preto macroregion in São Paulo showed that prices paid to producers in this region evolved less than for the aggregate in the state of São Paulo. The authors highlighted the importance of constructing and analyzing regional indices for assessing the value of production and for planning agro-industrial activities.

In the case of the study for animal production prices in Espírito Santo, in most of the historical series, the IPR evolved more than for the national aggregate reference indices (Figure 4). This result indicates that animal production prices in Espírito Santo have risen above the general national price average. In this sense, it is also important to compare the indices of the different products that constitute the bundle (Figure 3).

The study of Ostapechen (2021) presented the calculation of the IPR for livestock and crop products for the five macroregions of Brazil. For the livestock IPR, six products were considered: cow, ox, pig, poultry, eggs and milk. For the crop IPR, 25 agricultural products were considered. The results showed that when a smaller number of products are considered in the index, or grouped by type, such as livestock, the regional indices showed the reality of price fluctuations received by rural producers with greater precision.

Corroborating the idea of the above-mentioned author, the results presented in figure 3 allow to verify which sectors are experiencing the greatest income accumulation in relation to the average of the sector or bundle of products considered in the research.

CONCLUSION

When comparing the index calculated with national aggregate indices, the IPR for animal production in Espírito Santo was above the IPCA and IGPM for most of the historical series. The IPR was closer to the IPCA, compared to the IGPM. The IPR proved to be better than the IGPM, as it better highlights the price variations that occurred, especially in more cri-

tical periods of the economy, such as the pandemic.

The rise in prices for products of animal origin resulted from significant increases in the prices of meat and chicken eggs. Eggs were the product that had the greatest price variation, with an increase of 356.4%. This result shows that producers in this sector are accumulating more income in relation to the others that constitute animal production in Espírito Santo. Pig slaughter was the product with the lowest variation, accumulating a 180.87% increase and was the only one that was below the bundle aggregate IPR (194.8%) at the end of the period under analysis. This shows that pig producers accumulate less income compared to other sectors.

ACKNOWLEDGEMENTS

Espírito Santo Research and Innovation Support Foundation (FAPES); Capixaba Institute of Research, Technical Assistance and Rural Extension (Incaper) and State Secretariat for Agriculture, Supply, Aquaculture and Fisheries (Seag)

REFERENCES

BARROS, G. S. C.; CASTRO, N. R.; GILIO, L.; MORAIS, A. C. P.; SOUZA JUNIOR, M. L.; MACHADO, G. C. **Índices de preços ao produtor de grupos de produtos agropecuários (IPPA) – Metodologia e primeiros resultados**. Centro de Estudos Avançados em Economia Aplicada (CEPEA), Piracicaba, sep. 2019.

BIALOSKORSKI NT, S.; OHIRA, T. H. **Importância e metodologia de regionalização de índice de preços ao produtor: o caso da macroregião de Ribeirão Preto**. Texto de Discussão - Série Economia 22, FEA-USP, Ribeirão Preto, 2001. Available in: https://www.fearp.usp.br/images/pesquisa/Anexos/Publicacoes/Textos_discussao/REC/2001/wpe22.pdf. Access at: jan. 2 2024.

BINI, D. L. de C.; PINATTI, E.; ANGELO, J. A.; COELHO, P. J.; SANTA, R. M. S. **Modernização do levantamento dos preços médios mensais recebidos pela agropecuária paulista, 2009-2013**. Instituto de Economia Agrícola - IEA. São Paulo, p. 8., v. 8, n. 6, 2013. ISSN 1980-0711

CAETANO, C. Departamento de administração e

economia divulga o índice de preços recebidos (IPR) no Sul de Minas. **Diretoria de comunicação da Universidade Federal de Lavras**, Lavras, 24 jan. 2017. Available in: <http://www.ufla.br/dcom/2017/01/24/departamento-de-administracao-e-economia-divulga-o-indice-de-precos-recebidos-ipr-no-sul-de-minas/>. Access at: jan. 2 2024.

CARVALHO, J. C., PAVAN, L. S.; HASEGAWA, M. M. Transmissões de volatilidade de preços entre Commodities agrícolas brasileiras. **Revista de economia e sociologia rural**, v. 58, n. 3, e193763, 2020. Available in: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-20032020000300214&lng=en&nrm=i-so. Access at: jan. 2 2024

FGV. Fundação Getúlio Vargas. **Índice geral de preços - Mercado - IGP-M**. Available in: <http://www.ipeadata.gov.br/>. Access at: nov. 20

GALEANO, E. A. V.; MASO, L. J.; GUARÇONI, R. G.; BORGES, V. A. J.; OLIVEIRA, N. A. de.; TAQUES, R. C.; OLIVEIRA, L. R. de. **Levantamento de preços recebidos pelos produtores do Espírito Santo (2000 a 2015)**. Vitória, ES : Incaper, 2016. 229p. (Incaper. Documentos, 240).

HOFFMANN, R. **Estatística para economistas**. 4. ed. São Paulo: Cengage Learning, 2006. 432p.

IBGE. Instituto Brasileiro de Geografia e Estatística. Pesquisa trimestral do abate de animais - Sistema IBGE de recuperação automática de dados – Sidra IBGE. Available in: <https://sidra.ibge.gov.br/pesquisa/abate/tabelas>. Access at: nov. 2023.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Pesquisa trimestral de leite - Sistema IBGE de recuperação automática de dados** – Sidra IBGE. Available in: <https://sidra.ibge.gov.br/pesquisa/abate/tabelas>. Access at: nov. 2023.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Pesquisa trimestral de ovos de galinha - Sistema IBGE de recuperação automática de dados** – Sidra IBGE. Available in: <https://sidra.ibge.gov.br/pesquisa/abate/tabelas>. Access at: nov. 2023.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Pesquisa pecuária municipal – PPM. Sistema IBGE de recuperação automática de dados** – SI-

DRA IBGE-PPM. Available in: <<https://sidra.ibge.gov.br/pesquisa/ppm/tabelas>>. Access at: nov. 2023.

INCAPER. Instituto Capixaba De Pesquisa, Assistência Técnica e Extensão Rural. **Levantamento de preços pagos aos produtores**. Vitória, 2023. Available in: <https://incaper.es.gov.br/sispreco>. Access at: nov. 2023.

MARGARIDO, M. A. **Transmissão de preços agrícolas internacionais sobre preços agrícolas domésticos: o caso do Brasil**. 173f. Tese (Doutorado em Estatística e Experimentação Agronômica) - Escola Superior de Agricultura Luiz Queiroz, Universidade de São Paulo, Piracicaba, 2000.

MONTEIRO, M. J. C.; GRAMACHO, A.; CUNHA, M. A. S. D. **Revisão da metodologia de cálculo dos índices setoriais agrícolas** - índice de preços pagos pelos produtores rurais (IPP) e índice de preços recebidos pelos produtores rurais (IPR). IPEA. Brasília, DF, p. 107. 1994.

OSTAPECHEN, L. A. P. **Avaliação dos índices nacionais e regionais de preços recebidos pelos produtores agropecuários**. 2021. 126f. Dissertação (Mestrado em Economia) – Universidade Estadual do Oeste do Paraná, Toledo, 2021.

PINATTI, E; SACHS, R.C. C.; ÂNGELO, J. A.; GONÇALVES, J. S. Índice quadrissemanal de preços recebidos pela agropecuária paulista (IQPR) e seu comportamento em 2007. **Informações Econômicas**, São Paulo, v.38, n.9, set. 2008.

PINATTI, E.; BINI, D. L. de C.; COELHO, P. J.; MARIANO, R. M.; VEIGA, A. Reestruturação do levantamento de preços médios mensais recebidos pelos produtores no Estado de São Paulo, 2009. **Informações econômicas**, São Paulo, v. 40, n. 11, p. 05-11, 2010.

SCHWANTES, F.; BACHA, C. J. C. Análise da formulação da política de garantia de preços mínimos no Brasil pela ótica da economia política. **Nova economia**, Belo Horizonte, v. 29, n. 1, p. 161-192, abr. 2019. Available in: <https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-63512019000100161>. Access at: 2 jan. 2024. <https://doi.org/10.1590/0103-6351/3926>.

SOUZA, P. M. de; FORNAZIER, A.; SOUZA, H. M. de; PONCIANO, N. J. Diferenças regionais de tecnologia na agricultura familiar no Brasil. **Revista de economia e sociologia rural**, Brasília, v. 57, n. 4, p. 594-617, 2019.

VARASCHIN, M. J. F. C; SOUZA FH, J.; ZOLDAN, P. C. **Metodologia de cálculo dos índices agrícolas IPP, IPR e IPRr , IPR e IPRr**. Florianópolis: Instituto Cepa/SC. 2004. 61p.