

SOCIO-ECONOMIC ANALYSIS OF CAGE DROPPING OUT IN CALF REARING IN BULGARIA

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Abstract

Goal: to evaluate the effects of introducing the ban on cage calf rearing in Bulgaria.

Material and methods: In order to gain insight into the complex socio-economic implications of EC initiative to phase out cage farming of farm animals in the EU, a science-based assessment at the calve-rearing at national sectoral level is made. The RCA method is applied to 3 scenarios: baseline status quo scenario; with voluntary introduction of non-cage calf rearing and market pressure; mandatory regulation with a transition period of up to 10 years for full implementation. A list of indicators by typology and types is compiled.

Results: The scenario with mandatory regulations for the cancellation of cage rearing, with a proposed 10-year transit period, is estimated by the industry to receive an insignificantly lower overall score on the included 25 indicators than the other scenarios.

Conclusion: The ban on cage calf farming should not lead to severe and serious adverse effects related to both investment burden and rising production costs, even it can bring some positives, mostly in relation to the labor need, and it will not have, or will have only minor, adverse production effects on the sector.

Keywords: assessment, calf rearing, cage dropping out.

Introduction

On 10 June 2021, the European Parliament adopted a Resolution calling on the European Commission to propose legislation to phase out the cell farming of farm animals in the EU. As a result, the European Commission on 30 June 2021 in its Communication undertakes to propose the requested legislation. This commitment is also part of the adopted "Farm to Fork" strategy for sustainable food production. In a short period of time, the European Commission is expected to come up with the relevant proposals for legislative changes aimed at phasing out the use of cages in raising farm animals, namely laying hens, sows, calves, as well as rabbits, quails, ducks and geese. The phase-out transition period will be determined after the

Commission presents its formal impact assessment. In this context, there are voices in Bulgaria in favor of national legislation to end the breeding of calves in cages in our country.

In order to gain insight into the complex socio-economic implications of the EC's initiative to phase out cage farming of farm animals in the EU, an attempt to carry out a science-based assessment of calf rearing at national sector level is performed. Cattle breeding in Bulgaria has seen a general decrease in production and value in the years following the country's accession to the EU. Regarding the number of calves (animals under 10-12 months of age), which at the end of the year are in farms in the country, a continuous decline has been noticed since 2007. While the number of cattle in the same period between 2007-2022 remains relatively stable between 550-600 thousand heads, there is a reduction of around 35% in calves from 165 000 to a little bit more over 100 000 heads. It is important to make a reasoned review to evaluate the effects and impact of introducing the ban on cage farming of calves in Bulgaria, determining the possible impacts and externalities that reveal the economic risks as well as the prospects for the sector, what is the overall aim of the study.

Methodological approach

The concept of moving to non-cage farming of calves (as well as other farm animals) has social as well as environmental, humane and economic aspects. Therefore, it is important to weigh the benefits, advantages and disadvantages of such a change, looking from all sides. According to the assigned task, the present study should consider two main hypotheses and development options (scenarios). The first scenario is with the presence of a mandatory regulatory environment, but with a long-term transition period of up to 10 years for the full introduction of cage-free calf farming and the imposition of customs restrictions on imports with full reciprocity; the second is with the voluntary introduction of cage-free calf rearing and market pressure. The assessment of the situation in these scenarios should be compared with a "status quo baseline scenario", where the continuation of the situation as it is without any changes regarding the requirements and expectations from the legislation is considered. In the "status quo baseline scenario" the situation is assumed without such a prohibition and the sector develops in the known way, free from any commitments (regulatory), keeping all internal and external factors as they are known at the time of conducting the survey. The assumed external and internal factors for the considered production (macroeconomic, technological, geopolitical, social, consumer, etc.) are assumed as a conditional constant that has an influence, but this influence is equal for all considered scenarios. In order to be able to assess both the benefits and the costs and the results that can be obtained under the different scenarios, as well as to make a comparison, a list of indicators has been compiled by typology (outcome, derivative and impact) and by types of areas they cover – investment, supply, output quality, prices, income and employment. These areas reflect the different socio-economic and environmental dimensions of this production and the aspects in which changes can be observed as a result of the possible measures and scenarios envisaged.

In order to assess the effects, benefits and costs reflected in the specific indicators, in-depth interviews with sector' experts are conducted, as well as case studies with producers in the sector who will be able to outline the expectations and assessment of the effects and needs for

the individual participants, which are expected to be affected. Obtaining quantitative results for each indicator allows for an assessment of each scenario. To accomplish this task, the Relative Comparative Assessment method is applied. The chosen methodological approach tries to collect primary information and data from in-depth studies among producers in the sector and, in parallel, to present these and the results of various literary and scientific studies dedicated to this topic. The assessment is obtained for each indicator and each scenario, according to the formula $ISA_{Sk} = \frac{SIV_k}{AVR_S + AVR_S * CV} * (0,5 + 0,5 * CV^2)$, from the methodology, described by Ivanov (2023), considering the quantitative value of the indicator in the relevant scenario (SIV_k) and the average value of the same indicator AVR_S within the three scenarios considered.

This methodology for evaluating the formulated scenarios can also be supplemented by measuring the probabilities of obtaining the specific parameters and results of the expert predictions on the set indicators. The measurement of the probability of occurrence of each scenario was done using the method of Probability Measurement with Covariance (PROCOV). The methodology for calculating the probabilities is described and approved by Ivanov (Ivanov et al., 2022) and includes a series of calculation steps that are described in detail in the study. Both the RCA and PROCOV methodologies provide an overall assessment of how each scenario compares against the baseline, status quo scenario where the proposed calf cage containment measures are not expected to operate.

The results of the conducted study and the assessment made on the basis of the quantitative judgments and assumptions of the experts and experts from the covered sector are compared with data and results of various reports and scientific studies in the field. The aim is not only to draw a parallel and see the similarities and differences in expectations and measurements that are obtained between individual sources of information, but also to supplement and enrich the analysis with facts and other measurements that cannot be obtained from in-depth interviews.

Results and discussions

A) Overview of investment and production efficiency

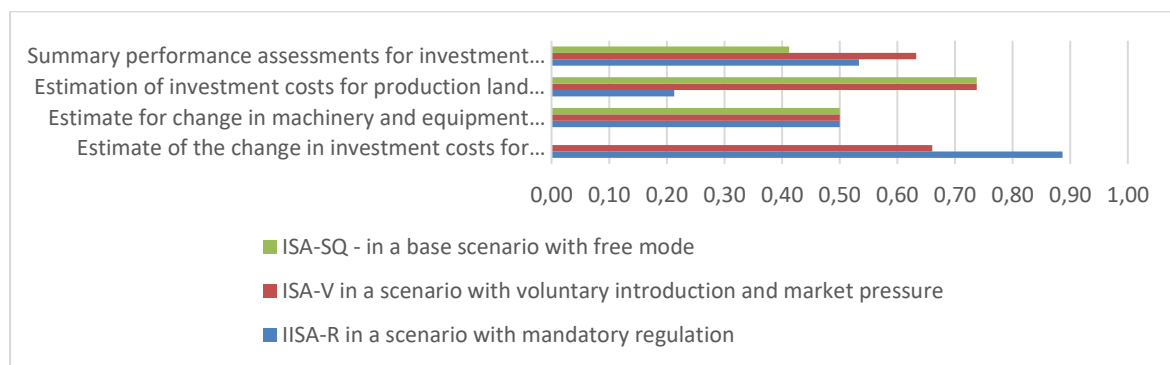
The concept of moving to non-cage farming of calves (as well as other farm animals) has social as well as environmental, humane and economic aspects. Therefore, it is important to weigh the benefits, advantages and disadvantages of such a change, looking from all sides. A number of scientific studies, as well as official documents of the EC (J. Urios et al., 2022), Harvey et al., 2013), EC, 2021), Rodenburg et al., 2020), Guyomard et al., 2020), Scientific Briefing on Caged Farming (2021) discuss the issues of ending using the cages for raising farm animals (including calves in particular), addressing aspects related to the possible necessary investments, as well as aspects of production efficiency, consumption, prices, product quality, profitability and employment, management approaches, skills, labor requirements and many others.

Evaluating the investment and production efficiency of different calf rearing technologies is an indicator of how successful different technologies would be, mostly from an economic point of view.

Overview of investment efficiency

The investment efficiency in rearing calves is based and evaluated on 3 indicators - buildings and internal infrastructure, equipment and facilities and field area and service (external) infrastructure. The evaluations of the three scenarios show that the worst level can be expected in the base scenario where there is a free regime of rearing calves with the continuation of the known and current situation. The assessment of investment efficiency in this scenario amounts to 0.41, which corresponds to a satisfactory position of investment efficiency. The summary score for investment efficiency under the mandatory regulation scenario is 0.53, which corresponds to a moderate position of investment efficiency. At the same time, the highest investment efficiency as an estimate is obtained in the scenario with voluntary introduction of non-cellular calf rearing and market pressure, indicating that it is best adapted to the current situation. The evaluation of the three indicators was calculated at 0.63, which corresponds to a high comparative evaluation of the investment efficiency, which shows that, compared to the other two scenarios, there will be the lowest increase in costs and investment inputs.

Figure 1. Indicative performance evaluations according to the investment efficiency scenarios



Source: Own calculations based on data from in-depth interviews with industry professionals and experts.

A comparative review of literature and other research sources (J. Urios et al. (2022), Harvey et al. (2013), EC (2021), Rodenburg et al. (2020), Guyomard et al. (2020), Scientific briefing on caged farming (2021) shows that the costs of transitioning to cage-free animal husbandry (including calves) will most likely vary (and significantly) between farms and will depend on a number of factors - age and type of available equipment, necessary changes, market conditions and prices, consumer support, changed requirements in feeding technology, etc. The general view is that the burden of potential initial investments could be reduced through public funding mechanisms, and the role of the CAP in supporting certain forms of governance in the transition, the role of market returns from cage-free products and the role of consumers in paying for such products are highlighted.

Overview of production efficiency

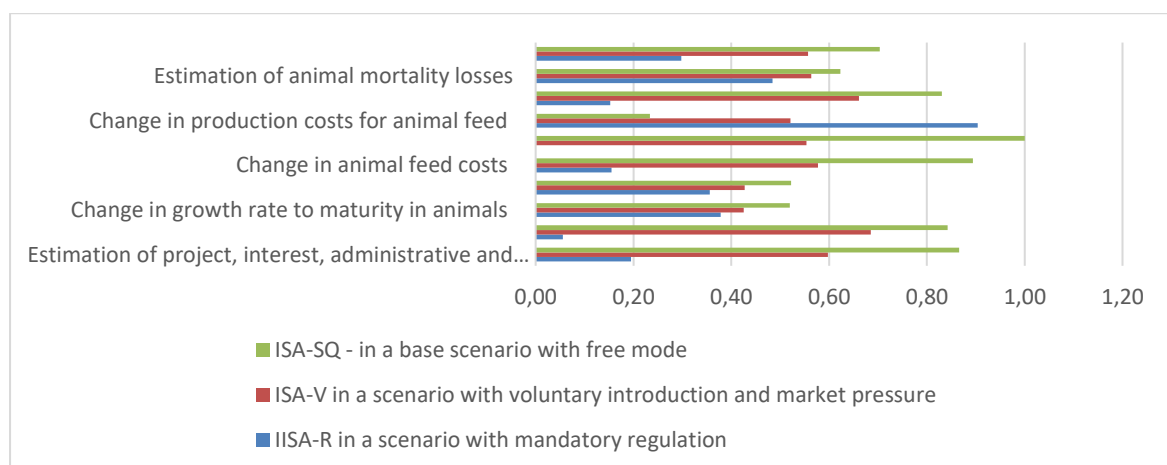
The production efficiency in the research is based and evaluated according to 9 indicators - project, interest, administrative and transaction costs; changing the amount of feed, supplements, water and other ingredients for raising animals; change in growth to maturity in

animals; change in productivity and productivity of animals; change in animal feed costs; change in air conditioning overhead costs; change in production costs for feeding animals; change in the costs of veterinary and medicinal preparations; mortality losses.

Stakeholder opinions from in-depth studies and real case studies show that, in contrast to the investment efficiency scenarios, the production efficiency scenarios have the highest rating and best comparative levels of the three scenarios to be expected in the baseline scenario. The production efficiency in this scenario receives a summary score of 0.70, which corresponds to high and significantly outperforms the other two scenarios in terms of expected changes in production efficiency.

Regarding some indicators of production efficiency, some scientists such as Valníčková et al. (2015), Costa et al. (2016), Jensen et al. (2015), Jensen et al. (2013) state that calves reared in pairs or groups show higher average daily gain and eat more than individually reared calves; that stable (unchanging in composition) groups of calves show a reduced incidence of diarrhea and improved respiratory health; that calves reared in pairs start eating solid food earlier than individually reared calves. According to Jensen et al. (2013) “when calves are group-housed, they acquire normal social skills and form social relationships. Social contacts stimulate early acceptance of solid food and calves reared in groups cope better with challenges such as weaning and regrouping. This may be especially true if the original groups are maintained. Health problems associated with group housing are largely due to large group sizes and dynamic group structures, while the benefits of social contact are achieved by housing calves in pairs or small groups.” In addition, authors such as Søren et al. (2023), Costa et al. (2016), Delafosse et al. (2015), Größbacher et al. (2018), Jensen et al. (2015) form the opinion that calves try to suckle from each other when they have no other way to suckle, either because they are fed from buckets, or because they are weaned too early, or because they are not given enough milk. According to these authors, group-housed calves react less to stressful procedures, including blood sampling and others, and vocalize less after separation from the cow, compared to individually-housed calves. All that shows that there are also many arguments “for” cage-free calf farming in the studies.

Figure 2. Indicator performance evaluations according to the production efficiency scenarios



Source: own calculations based on data from in-depth interviews with industry professionals and experts.

The most significant factors contributing to the significant decrease in production efficiency in the scenario with the introduction of regulations in local conditions are the consequences of the increased costs of veterinary and pharmaceutical products, the increase in the amount of feed, additives, water and other ingredients for raising animals, as well as the increased administrative and transaction costs, which are expected to increase significantly (30% compared to the current situation) and concerns about an increase in overall mortality.

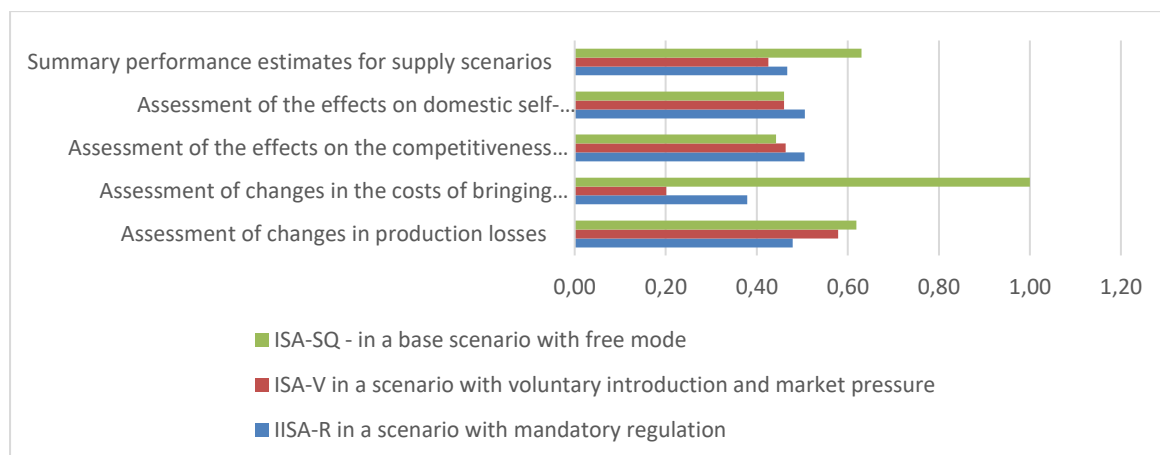
B) Assessment of the impact of phasing out the cage rearing of calves on supply, quality, consumer prices, consolidation, profitability and employment

- *Assessment of the impact of abandoning the cage rearing of calves on supply*

Assessing the impact of abandoning cage farming of calves on the supply was measured by means of 4 indicators from the conducted in-depth study - production losses, costs of bringing the finished product into marketing form for market realization, competitiveness and market performance of the farms and the sector and internal self-satisfaction and food security of the population.

The results show that in the baseline scenario with free mode, the aggregate score for the four indicators is 0.63. This assessment means that, according to the stakeholders in the conducted in-depth interviews, negative effects on the supply are not foreseen, on the contrary – a good and high performance is foreseen. The regulation scenario results in a score of 0.47.

Figure 3. Indicative performance evaluations under the scenarios for the effects on the supply in cattle breeding, sector "calves"



Source: own calculations based on data from in-depth interviews with industry professionals and experts.

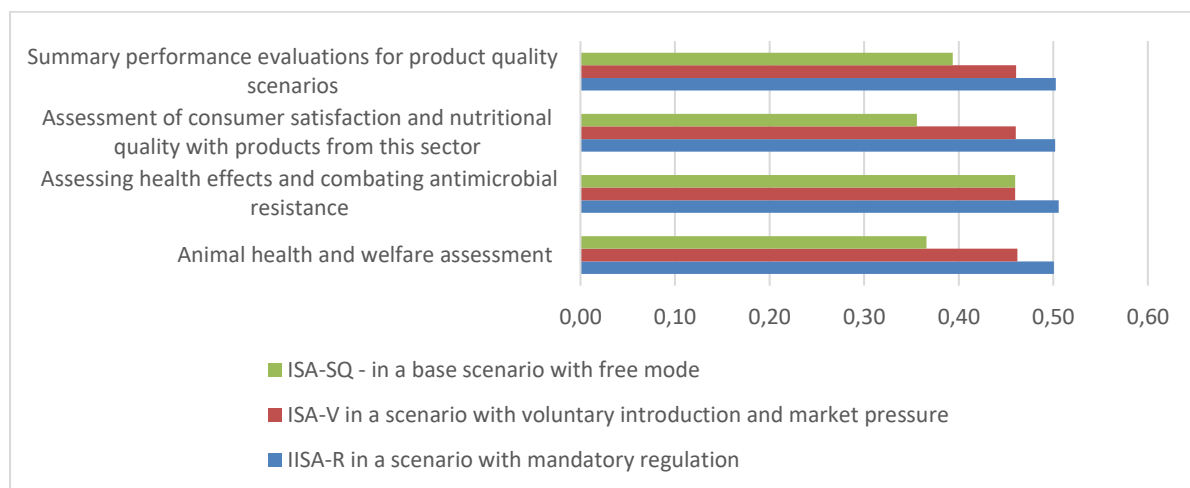
- *Evaluation of the impact of abandoning cage farming of calves on product' quality*

Improving the quality of agricultural products consumed by the population, as well as the consumer satisfaction of people from consuming quality food, are an indisputable reason to support the proposal to introduce and enforce the new standards for cell-free farming of industrial animals, including calves. People are especially sensitive about the humane treatment of animals. If more humane technologies lead to an increase in product prices, however, consumers would hardly be so satisfied and ready to buy – not only the social and environmental aspects of the issue, but mostly the economic ones would have an impact here.

In the conducted study, it is found that for all three included indicators of product quality and animal welfare, the highest score compared to the current situation and in terms of performance and the other compared scenarios is for the option with mandatory regulations - 0.50. This statement is also confirmed by some researchers – Valníčková et al. (2015), who found that rearing pre-weaned calves in pairs, rather than individually, positively affects behavioral responses in new social and environmental situations, but concerns are also expressed that close contact between many young animals may damage their health.

Yansen&Larsen (2014) argue that allowing physical contact and housing in pairs does not affect the health of the calves. There are studies that conclude that product quality is better with cell-free calf rearing technologies – Søren et al. (2023), as well as the national representative sociological survey “Public attitudes towards the conditions of industrially raised farm animals in Bulgaria” prepared by Links Market in November 2023, for “Invisible Animals”.

Figure 4. Indicative performance evaluations under the scenarios for the effects on the quality and conditions of rearing in cattle breeding, sector "calves"



Source: own calculations based on data from in-depth interviews with industry professionals and experts.

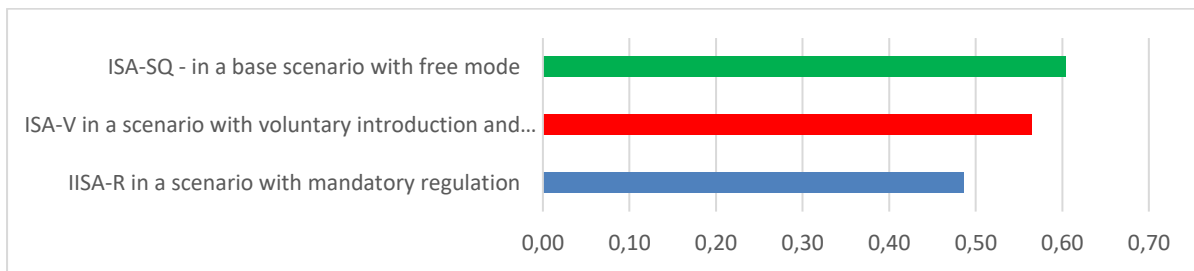
The lowest score on this issue is obtained for the scenario of maintaining the status quo, where the score is 0.39.

• *An assessment of the impact of the phase-out of cage farming of calves on consumer prices*

The study found that when introducing free-range calf farming, the prices of products from this sector would increase (based on increased investment and production costs), with this increase being highest for the scenario with legislation. It is here that a significant role in the success of the transition to cage-free farming would be played by both the state's policy to support farmers and the extent to which consumers would be willing (and able) to pay higher prices for cage-free calf products.

The differences in the indicator scores under the three scenarios, although not so large (0.49 for the scenario with legislation, 0.56 for the scenario with voluntary practices and 0.60 for the baseline), exist and are evidence that in terms of the impact on consumer prices in the sector, the status quo scenario is best adapted to the current situation.

Figure 5. Indicative performance evaluations under the scenarios for the effects on consumer prices in cattle breeding, sector "calves"

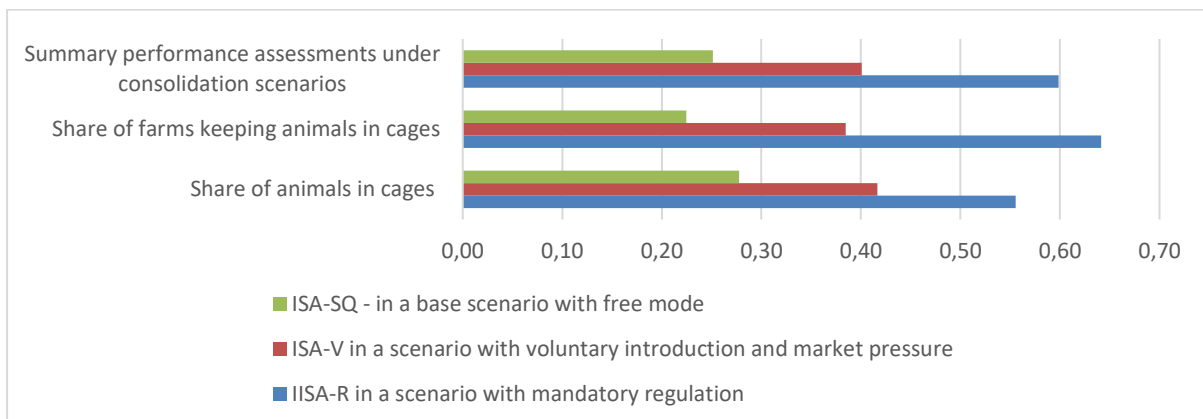


Source: own calculations based on data from in-depth interviews with industry professionals and experts.

● *Evaluation of the impact of phase-out of cage farming of calves on the consolidation of production*

The impact on consolidation is assessed on 2 indicators from the conducted in-depth study - share of holdings keeping animals in cages and share of animals in cages. The results of the in-depth interviews show that the scenario with legislation and a 10-year transition period for the full introduction of cell-free calf farming has the highest average performance indicator score - 0.60, and the base scenario is understandably the lowest - 0.25. The summary results show that, in terms of the impact on the consolidation of production in the sector, the highest performance and the most adapted to the current conditions is the scenario with mandatory regulation.

Figure 6. Indicative performance evaluations under the scenarios for the effects on consolidation of production in cattle breeding, "calves" sector



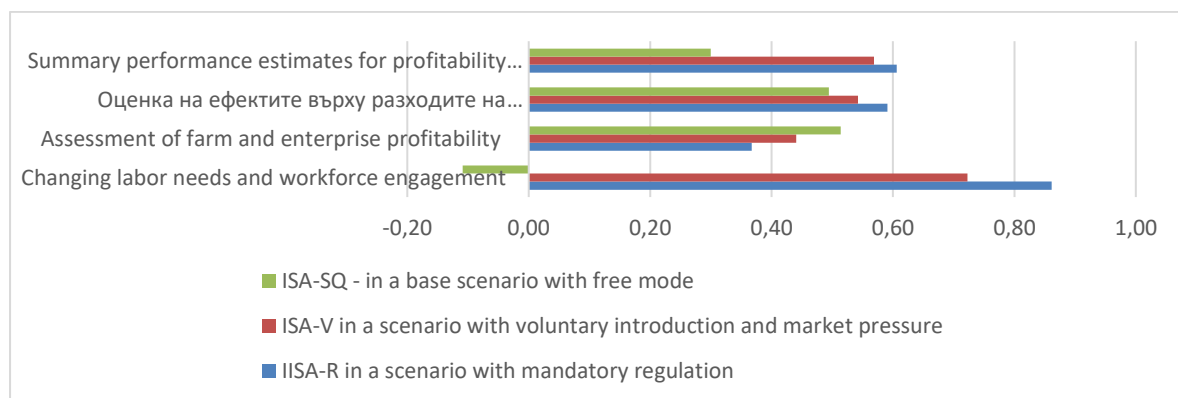
Source: own calculations based on data from in-depth interviews with industry professionals and experts.

● *Assessing the impact of phase-out of cage farming of calves on profitability and employment*

The impact on profitability and employment is based and evaluated according to 3 indicators from the conducted in-depth study - household expenses for the supply of products from the sector; farm profitability and need for labor and manpower.

Authors such as Costa et al. (2016) argue that automatic feeding systems can be used when feeding group-reared calves, thus reducing labor costs compared to individual calf rearing. The results of the conducted research show that, according to the interviewees, the need for labor and the commitment of the labor force will decrease due to the mechanization and automation of most processes, and the profitability of the farms during the transition will decrease (at least initially). In the conducted study, it is established that for two of the three included indicators for profitability and employment, the highest evaluation compared to the current situation and in view of the presentation and the other compared scenarios is for the option with mandatory regulations. He also has the highest overall score – 0.61. The lowest score on this question is obtained for the scenario of maintaining the status quo, where the score is 0.30. From the data it can be concluded that in terms of employment and profitability in the sector, the scenario with legislation when moving to cell-free calf rearing is significantly higher rated, most favorable and most adapted.

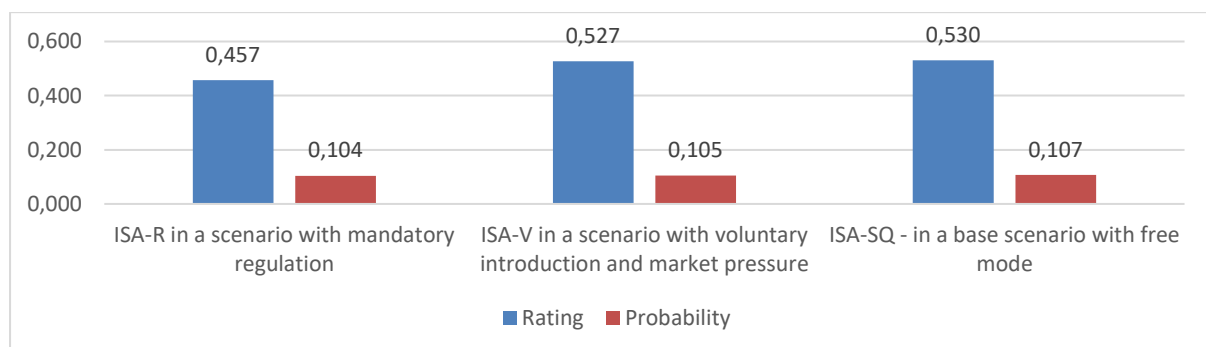
Figure 7. Indicative performance evaluations under the scenarios for the effects on profitability and employment in cattle breeding, sector "calves"



Source: own calculations based on data from in-depth interviews with industry professionals and experts.

C) Assessment and probability of occurrence of the scenarios

Figure 10. Assessment and probability of occurrence of the scenarios in cattle breeding, sector "calves"



Source: own calculations based on data from in-depth interviews with industry professionals and experts.

From the analysis carried out in the form of in-depth studies and a parallel review of independent studies, as well as from the compiled quantitative assessments of three types of indicators, categorized by key areas where the benefits, costs and externalities should be sought, the industry's concerns about the sought-after change in animal husbandry, some of which more, others less are reflected in the scientific literature. However, the scenario with mandatory regulations for the cancellation of cage farming, with a proposed 10-year transit period, is estimated by the industry to receive an almost insignificantly lower overall score on the included 25 indicators than the other scenarios - the overall score on the covered indicators in this scenario, which evaluates the result in relation to the importance to the current situation is 0.46. The assessment of the baseline scenario according to the opinions of the stakeholders interviewed is superior, but not by a large margin, to the alternative scenario of banning cages and is equal to 0.53. In essence, there is no discernible qualitative difference between the two evaluations of the two scenarios in the calves, with both evaluations falling at the interpretive level of relative parity and lack of advantages and superiority of any of the scenarios considered in terms of total effects and externalities.

Conclusions

It would not be possible to say unequivocally and categorically that the end of the use of cage farming of calves should be favored without appeal (in a specific directive regulating the humane treatment of calves it is written that since 2007 it is not allowed to restrain a calf in an individual cage after eight weeks of age. However, individual rearing of calves is possible under the conditions of the applicable EU legislation). In this regard, there are differing opinions for and against certain details of the cage removal process among both manufacturers and researchers. Moreover, there is no single formula for the transition that is applicable to the entire EU.

From the presented review and analysis, it can be concluded that the ban on caged calf farming should not lead to severe and serious adverse effects related to both investment burden and increasing production costs, reduced competitiveness and returns on farms and rising prices leading to more costs for consumers, even it can bring some positive results (mostly in relation to labor demand) and there will be no or only minor adverse production effects on the sector.

Calves are kept confined in cages for various, primarily economic reasons. This technology is cost-effective and to some extent, especially in intensive production units, some degree of indoor confinement may also be necessary for biosecurity reasons to prevent some animal diseases as well as increased risk of mortality. There is a shared understanding that discontinuing the use of cages will require changes to current farming systems, as well as often expensive investments, but also a shift to higher standards of animal welfare, hence improving the reputation of farmers in society, increasing confidence in their activities and a possible increase in demand for the products, which guarantees better incomes for farmers. That is why it is important to correctly and multifacetedly assess the impact of banning cell culture - from the point of view of the benefits and welfare of the animals themselves; from the point of view of environmental aspects; from the point of view of the social and economic needs of the sector, as well as from the point of view of food security and the health and well-being of consumers.

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