BAT Techniques in Agribusiness through the Prism of Sustainable Development in the Republic of Serbia

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Abstract: Today’s climatic, ecological, and social challenges impose pressure on decision-makers to provide systemic solutions in all areas of business, including agribusiness. The changes that take place within the domestic regulatory framework need to be harmonized with the international legal framework of the sustainable development of the European Union. This will directly affect new solutions for achieving the goals of sustainable development. Modern livestock farms imply the use of modern agricultural mechanization following BAT techniques. The application of the principles of BAT techniques should be included in all stages of the production process on the farm. This includes planning, operation, maintenance as well and closing the farm according to acceptable technical and economic conditions, all to achieve the highest possible level of environmental protection.

This work aims to point out the importance of BAT techniques in agribusiness through the prism of sustainable development in the Republic of Serbia. The first part of the paper analyzes the impact of global trends on agribusiness in Serbia. The second part indicates the importance of applying BAT techniques for sustainable development, while the third part of the paper examines the possibility of applying BAT techniques from the aspect of animal husbandry.

1. INTRODUCTION

Today’s global challenges have a long-term impact on climate, environmental and social factors. Considering that sustainable development is being pursued more and more, there is increasing pressure to provide systemic solutions, in all areas of business, and therefore also in agribusiness. Sustainable agricultural development implies the preservation of soil, water, plant and animal resources, while it is technically applicable, economically profitable and socially acceptable (Ristić, 2023). Considering that the pillars of sustainable development are economic, social and ecological, all three pillars must be harmonized (Vučić, 2006).

Agriculture as an economic branch affects economic development directly and indirectly, which together through the application of appropriate measures, can improve the state of agribusiness. Some of the measures can be related to increasing the participation of large commodity producers (which would increase the productivity of production), regulating the market of agricultural products, increasing the role of the state through increasing the agricultural budget (larger participation of subsidies or premiums for further development), construction of irrigation systems, education of the population, increase of investments, development of small agribusiness and entrepreneurship and faster implementation of standards (Tomić & Tomić, 2011).

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Bearing in mind the social and economic changes that the Republic of Serbia has faced in the last few decades, there is an urgent need to create adequate solutions for the most efficient functioning (Kočović & Radovanović, 2014). Changes within the domestic regulatory framework need to be harmonized with the international legal framework of sustainable development of the European Union (Tasić, 2015), which results in the creation of solutions for sustainable development goals.

Best Available Techniques (BAT) have been introduced by IPPC Directive 96/61/EC and are in accordance with the Law on Integrated Prevention and Control of Environmental Pollution („Sl. glasnik RS“ br. 135/2004, 25/2015 i 109/2021). Their definition can be given according to the abbreviation BAT, where: B - “best” implies the most effective performance in achieving a high general level of environmental protection; A - “available” means a technique developed to a degree that enables application in a certain industry sector under economically and technically acceptable conditions, including costs and benefits, (if it is available to the operator under normal conditions); T - “technique” means the way a facility is designed, built, maintained, operated and decommissioned or closed, including the technology used. BAT is accompanied by reference documents known as BREFs for different sectors (Stafford, 2015).

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2. IMpact of global trends on agribusiness in serbia

Sustainable development as one of the most popular phenomena today, especially within the framework of the Agenda for Sustainable Development until 2030, created by the United Nations, is aimed at balancing numerous economic, environmental and social development goals, as well as the importance of the institutional component (Ristić, et al., 2019). Contemporary challenges of agricultural development in the Republic of Serbia are the subject of research by many domestic and foreign authors (Ristić, 2013), who deal with trends and modernization in agribusiness (Vujičić, 1997).

Today, rural areas around the world, and therefore also in the Republic of Serbia, face numerous internal and external challenges, especially environmental, technical-technological, institutional, economic-financial, social, regional, global, and similar (Kvrgić & Ristić, 2019). The global pandemic of COVID-19 also caused adaptation to new living conditions (Ignjatović et al., 2021), so the question arises as to what the real consequences will be for sustainable development.

In the world, the national strategy of agribusiness is defined and oriented primarily towards development goals, which consist of optimal use of available resources in agriculture, increasing the intensity (yield) of production, and increasing the volume of total production (Avdić, 2017). Thus, the development strategy is based on two models (Drobac, 2008):

- A model of agricultural growth, which means economic progress without radical qualitative changes;
- The development model is characterized by radical changes, including restructuring. This model is based on export orientation with an emphasis on increasing efficiency and changes in the production structure.
Serbian agriculture is based on small family farms with low labor productivity and small surpluses in production. The Agriculture and Rural Development Strategy of the Republic of Serbia for the period 2014-2024, defines the goals, priorities, and frameworks of political and institutional reforms in this area, as key internal challenges for the development of rural areas of the Republic of Serbia, are stated (SPRR, 2014):

• sustainable management of resources;
• knowledge transfer and technical-technological progress;
• increasing competitiveness;
• development of the food chain, with logistical support to the sector;
• development of rural areas and strengthening of the social structure of rural communities.

To adequately valorize agribusiness and increase its attractiveness, in the Republic of Serbia, it is necessary to infrastructurally modernize the villages, increase the profitability of agriculture and other activities in the countryside, encourage the development of rural tourism, small and medium-sized enterprises, develop agricultural business centers, implement permanent education of the rural population, better connect with international organizations, improve the promotion of sustainability, include environmental measures, follow new scientific trends (Milenković, 2007). That is why the development strategy of agribusiness should take into account natural and demographic factors, infrastructure, support from institutions and the legal and economic environment (Plojović & Bušatlić, 2011).

3. IMPORTANCE OF APPLYING BAT TECHNIQUES FOR SUSTAINABLE DEVELOPMENT

Sustainable agriculture is the production of food, fiber, or other plant or animal products, using agricultural techniques that protect the environment, public health, the human community and respect the principles of animal welfare. This form of agriculture enables the production of healthy food, without endangering production resources for future generations and leaves the possibility for them to do the same. The use of BAT techniques is one of the ways to achieve the goals of sustainable agricultural production.

4. BAT TECHNIQUES AND ANIMAL HUSBANDRY

The BAT concept as a regulatory standard is used to replace or improve existing legislative regulations as rules of good agricultural practice. Its application means that farmers will use techniques, methods and processes, which effectively prevent emissions into the environment and which are most effective in achieving a high level of protection for the environment as a whole (Möckel, 2015).

For operators of industrial and agricultural activities with a high potential for environmental pollution and endangering human health, including farms for intensive breeding of poultry and pigs that exceed certain capacities (projected number of places for housing animals), the European Union (EU) defines obligations and conditions which they must respect. For these reasons, an integrated permit was introduced, to prevent or reduce air, water and soil pollution, noise and vibration emissions, and the amount of waste (generated in industrial and agricultural complexes), with the efficient use of energy and other resources, i.e. ensuring high levels of environmental protection.
The permit prescribes monitoring that controls emissions into all environmental media, as well as the application of the best available techniques - BAT. Farms with intensive livestock production, for which it is necessary to obtain an integrated permit in terms of capacity, are characterized by a high degree of specialization and organization.

Activities on poultry and pig farms that can potentially affect the environment are pollution of surface and underground water (e.g. N₂O – and NH₃ +); acidification (NH₃, SO₂, NOₓ); eutrophication (N, P); air pollution, especially NH₃, N₂O, NO, dust, (PM₁₀ and PM₂.₅), bio-aerosols; increasing the greenhouse effect (CO₂, CH₄, N₂O); drying (due to the use of underground water); local disturbance (unpleasant smells, noise); diffuse spread of pesticides and toxic substances; spread of pathogens, including antibiotic-resistant pathogens; appearance of pharmaceutical product residues in water (Stafford et al., 2017).

According to research by Stafford et al. (2017), BAT techniques are singled out, the application of which on pig and poultry farms can reduce the negative impact on the environment:

- environmental management systems (EMS);
- good agricultural practice in the field of environmental management (site selection and spatial aspects, education and training; activity planning, emergency planning and management, cleaning, repair and maintenance, fodder storage, storage and disposal of dead animals);
- animal nutrition (multi-phase diet, low-protein diet supplemented with amino acids, adding the enzyme phytase to achieve a phosphorus-balanced diet in poultry and pigs, highly digestible inorganic phosphates in the diet);
- techniques for efficient use of water;
- techniques for efficient use of energy;
- techniques of noise emission into the environment (choice of ventilation system and equipment, ventilation design and construction of the facility, operational measures);
- techniques for reducing dust emissions (techniques for reducing dust emissions inside the facility for housing animals, techniques for reducing dust concentration inside animal facilities, air purification systems);
- techniques for reducing unpleasant odors (general measures, dilution of unpleasant odors);
- techniques for protecting soil and water from emissions from liquid manure storage (storage tanks, earth lagoons for liquid manure, measures to detect and prevent leaks in liquid manure storage, manure collection and transport systems);
- spreading manure on the fields.

The farm “Ruklada” from Lajkovac can be singled out as an example of good practice in the application of BAT techniques. The production capacity of the farm is 336,000 broiler chickens in one cycle, i.e. 1,580,000 broiler chickens per year. The resource savings of this farm compared to classic farms that do not use BAT are:

- Lower water consumption due to regular monitoring of consumption, use of efficient watering cans and dry cleaning procedure;
- Lower energy consumption, due to well thermally insulated buildings, efficient LED lighting and automatic control of fan operation - lower carbon dioxide (CO) emissions;
- A smaller amount of ammonia (NH), methane (CH) and particulate matter (PM) released from breeding facilities due to process control, application of a special feeding regimen, use of long straw for mats and effective ventilation;
- Fewer deaths due to automatic production control and improved technological parameters;
• By acting in accordance with the principles of the circular economy and handing over the manure for further use, emissions of nutrients such as nitrogen (N), phosphorus (PO) and potassium (KO) into water and soil, as well as emissions of ammonia (NH) into the air, were avoided, in relation to the usual practice of manure storage (IED, 2023).

An illustration of the savings is shown in Figure 1.

![Figure 1. Savings of resources by applying BAT techniques on the farm “Ruklada”](source: IED, 2023)

5. CONCLUSION

Favorable climatic conditions and abundant land resources are essential prerequisites for the development of agribusiness in the Republic of Serbia. However, numerous shortcomings refer to limited financial resources for investments, insufficient application of modern technologies in the agricultural and food sector, underdeveloped rural infrastructure, etc. The future development of agribusiness in the Republic of Serbia is significantly determined by internal factors, such as sustainable resource management, technical and technological progress, increasing the competitiveness of agribusiness, development of the food chain, development of the logistics sector, and others. However, external factors related to climatic, ecological and social changes should not be neglected. Sustainability in animal husbandry can be achieved by applying BAT techniques because it is based on the sustainable use of available resources and technologies. BAT techniques in animal husbandry, especially on pig and poultry farms, are regulated in Serbian legislation and harmonized with relevant EU directives. Their practical implementation is necessary because farms are recognized as major sources of environmental pollution.
References


