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Abstract: In the context of globalization One Health enables and concurs to the achievement of Global Health. One Health approach involves wide knowledge and understanding of its critical factors, next to an adequate implementation, also in farm animal sector. Moreover, animal farming and breeding shows particularities depending on country. Therefore, well-defined and specific strategies are still needed to be developed and adapted to the current conditions found in various countries for ensuring a well implementation, thus driving to better and healthier global outcomes and security. This paper will explore the One Health status in Romania, highlighting the current progress registered until now and the future perspectives based on its potential, in the context of the livestock farming framework and challenges. Our findings may help to disclose the challenges of putting in practice One Health in Romania, alongside to the pathways showing potential to enhance sustainability in livestock farming.

Keywords: farm animal genetic resources; sustainable livestock farming; local breed conservation; One Health; global health

1. Introduction: The sensitive One Health actual context, need and link with local farm livestock

Health was always on top of the human priorities, meanwhile the progress registered in the understanding and the knowledge of the pathways for achieving a better health status and outcomes had to face continuously challenges; thus, over the time health dimensions have changed up to the present [1,2]. Global health become a major concern, due to the current health systems threads all over the world. In addition, health is a crucial factor for the countries showing economic growth and social development, that are confronting with a higher number of issues related to diseases, in many cases as a consequence of deficient governmental national strategies defining and capacities for implementing health policies [3].

The boundaries between human health and animal health show sensitive apparent borders, especially in the context of their common shared ecosystems. Thus, the valences of health are interconnected throughout humans, animals and environments, all driving to a single, common and

shared health [4]. One Health can be considered an emerging holistic and integrated concept, based on the human–animal–environment interfaces and interconnections. One Health approach breaks down old and unsustainable practices in a global context, bringing together modern views in a new era advancing coordination, collaboration, multiple disciplines and sectors, which often need to be adapted to the specific conditions of various countries and regions. Despite the well-defined concept and guides for One Health approaches, its implementation might be difficult and challenging, depending on the development status and many other factors variation or specificity of each country [5,6].

Besides, no matter the time, humans had to deal with a large spectrum of diseases, including emerging infectious diseases able to lead to pandemics. Moreover, many novel emerging infectious diseases are zoonotic in origin, i.e., more than 70%-80% and have potential to cross the barriers of species and ecosystems [7,8]. Disease prevention, control or eradication in animals aims to avoid their transmission to humans and environmental protection, by targeting healthier animals both farm and wild, humans and environments. Wild animals' health protection is needed to attain One Health, as pathogens are able to pass from wild to domestic animals. Livestock farming might pose potential risks based on its practice and animal genetic resources, which is a variable across countries. meanwhile the target goals also vary based on each country specificity trying to attain sustainable practices, maintaining local farm animal breeds, improved animal welfare and health, limiting zoonosis and safe animal products [7–9].

The awareness of using One Health approaches gained field in the last time, mainly as a consequence of the increasing number of zoonosis events, spread, losses caused and considerable impact [10]. Therefore, many times humans were forced to find out immediate solutions based on collaborative and common efforts to break off the spread of such diseases and subsequently their impact at regional, national and global level. SARS-CoV-2 pandemic remind people the new dimensions of health and the humans-animals-environments links and interfaces, calling attention for implementing new holistic approaches as that of One Health, able to lead to rapid solutions and responses to zoonosis [10–13].

Moreover, the global pandemics are able to affect individuals, communities and countries attaining environmental, ecological, social, economic and political dimensions, which demand new strategies, facilities, data, support and access granted for all countries, for enabling humans to react in a joint effort. Also, it is important to be aware that the impact experienced by some countries and regions might extend to others, including worldwide. Consequently, it is essential that each country define and apply by specific means One Health concept to this goal, based on their particular national context and priorities. This paper aims to present the One Health status in our country, which could help for defining better strategies and aligning to the global health plan.

2. Materials and methods

In the context of the national agricultural policy attempt to be in line with the global and EU initiatives for adopting One Health approaches and addressing health threats at global level, a qualitative study conducted in Romania was carried out the endorse the One Health status in the case of the livestock farming. Key players from the animal breeding sector from our country was considered as data sources i.e., farm animal stakeholders, livestock breeder associations and competent authorities. The data related to farm animal resources and farms were collected through direct observation, discussion and survey. The official technical reports of the competent authorities from farm animal sector and animal breeder organizations were analyzed, next to the Romania's Rural Development Programme 2014-2020, related to the support measure M10 for endangered livestock breeds, the Romania`s Sustainable Development Program 2021-2027 [14,15] the specific EU Regulations as 1305/2013, 807/2014, 1012/2016 [16–18], Romania`s National Strategic Plan for CAP 2023-2027 (PS PAC 2023-2027) [19], Romania's Sustainable Development Strategy 2030 (The Department of Sustainable Development, 2018) [20], the Common Agricultural Policy (CAP) and One Health Joint Plan of Action (2022-2026) [21,22]. Previous studies showed Romanian difficulties to meet the European standards in livestock farming and environmental area [21,23–27]. Therefore, is

essential to assess if such impediments are still framing Romania`s farmers' reality and livestock sector in order to define better and adapted measures matching their possibilities and choices.

3. Results and discussion

3.1. Farm livestock genetic resources in Romania

In Romania, the farm livestock effectives are facing difficulties regarding their number, meanwhile the national policies are putting efforts and planning to increase their number and primary production, by means of breeding programs approved at national level by the competent authority i.e., The National Authority of Animal Husbandry ``Prof. dr. G. K. Constantinescu`` of the Ministry of Agriculture and Rural Development, and implemented by accredited associative forms for various breeds and species; the breeding programs in Romania mainly are aiming pure breeding strategies [28,29]. Moreover, attempts in maintaining a minimum population size of local breeds are still made for livestock genetics conservation [30,31]. Thus, considering general current practice and background in livestock farming in Romania, it shows a real potential to be further developed and extended to meet sustainability aims [20]. Thereby, in the context of the EU`s common agricultural policies, national polices are directed to support and to stimulate the farmers ensuring animal welfare, environmental and biodiversity protection, along with socio-economic rural development. These policies and plans fit to the conditions found in Romanian livestock farms i.e., small or medium farms in a high number of holdings, with a low number of effectives. Besides, the grazing livestock is largely used in such farm holdings from Romania`s villages, which acts against pasture, farming land and landscape degradation and environmental protection [32].

The livestock farm genetic resources from Romania are facing many challenges and changes [32–35], some of them showing potential to promote health benefits and others demanding attention due to the imminent current threats. The animal inventory reports prove the necessity to implement governmental strategies for increasing the effective livestock size in several farm species and conservation programs, in those under threat.

Nowadays, the most popular choice of Romanian farmers is cattle and sheep, meanwhile a considerable number of farmer (40%) are reportedly using endangered breeds, this preference and willingness being linked also to the monetary contractual support, enabling rare breed conservation [30].

After analyzing the current situation of the farm livestock resources we may conclude that in Romania there are still several breeds that are calling special consideration as a consequence of their decreased number and spread over the territory of the country. In swine, that is the case of Mangalica and Bazna, breeds rarely found in farm holdings. Also the Romanian Buffalo is rarely found over the territory of our country. The Romanian Grey Step Cattle and the Transylvanian Pinzgau match the same frame. As well, these bovine breeds coverage is mainly within specific areas of the country. Besides, the Romanian Grey Step Cattle, Transylvanian Pinzgau, Mangalica and Bazna breeds were included in national conservation programs in the last years [36–41]. The Romanian Spotted Cattle, The Romanian Black Spotted Cattle and the Maramures Brown cattle are still showing a decreased number across country [28,29,41]; besides the practice of crossing of these breeds with foreign breeds, by using frozen semen, especially from meat breeds is a threat for pure breeding and breed conservation. Thereby, farmers and authorities should enhance the awareness of the herein threat and take measures to avoid such risky practices.

In last years, foreign cattle breeds specialized for meat production gain field in Romania [28,29], being preferred by many farmers instead of milk breeds. The lack of employees in agriculture and animal husbandry, the limited financial resources, the low price of milk, the low access to advanced farming technology, including for milking, the easily farming system, the advantage of using the land by grazing are from the main factors contributing to such choice of an increasing number of Romanian farmers. Besides, the governmental financial support for meat cattle breeders [42] endorse such choices. Aberdeen Angus is the most widespread of these breeds [43]. Efforts were made also in the direction of promoting premium meat production of the Romanian Spotted Cattle [44], so that many farmers opted in favor of this breed; the lower acquisition price of animals from this breed

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concur to this choice, too. The indoor farming and feeding technology, limit the number of Holstein-Friesian cattle or other highly specialized dairy breed farms [45], in our country, even if progress in farming technologies was made, stimulated by financing supporting funds granted for acquiring new farming equipment and technology.

Sheep and goats are a part from the grazing livestock largely found in Romania. Tsurcana is the most common, widespread and with the largest effectives breed from the sheep population of Romania. Tsigai breed is showing a quite low number, as well as Merinos. Karakul sheep may be found only in specific areas of the country and still in a decreased number. The Carpathian and the White Banat goats are the autochthone breeds most found in Romanian farm holdings [28,29,41], Due to cow`s milk price diminution [46], sheep farming increased, especially in Tsurcana breed. Tsurcana registered a growing trend in our country [47], based on its meat qualities preferred by Arabians and meat market requirements of the Arabian countries, as well as for the higher adaptive and resistance traits, characterizing this breed. Foreign small ruminant breeds may be encountered, too, but in very low number.

Furthermore, the genetic background of local breeds still requires characterization and approach [48–55], most of all due to the potential valuable and healthy genetic variants present or not yet unveiled into their genomes. Even if research initiatives were carried out and financed in this direction from national and EU funds, related studies are still needed, thus there should be continued.

All these sustain that the actual status of farm animal genetic resources in Romania continues to show a high vulnerability, and is requiring further adequate actions and favorable strategies, to promote breed conservation, sustainable breeding and integrated animal health management. We consider that infield promoting and disseminating actions, persistent financial supporting measures, next to a closer relationship of local competent authorities and other main actors with farmers and farm animal associative entities are potential key drivers for a better understanding of the reality facts driving to a better multidisciplinary knowledge, awareness, willingness of acceptance, choice, preoccupation and implementation of sustainable practices of using livestock resources in Romania. A special interest should be addressed to the reproductive practices for maintaining pure breeds and the valuable local genetic pool of livestock resources. Even if initiatives were made, the development of the national gene bank for animal resources [56,57], it match the same frame.

3.2. One Health and livestock farming in Romania

Romania`s livestock farming sector

The livestock farming-human-environment link is obvious and well stated, while their interaction pathways often vary along countries and regions depending of their specific conditions i.e., geographic, climate, socio-economic and others [22,58].

The livestock farming is a main sector for people, especially considering the animal productions and with a clear impact on the environment. Either side, the genetic biodiversity conservation, which is a sensitive topic both for wild animals and also for several autochthone breeds, mainly for those in danger or already lost from local areal in various countries [59]. Besides, autochthone breeds interact with the environment, also throughout their valuable traits e.g., higher adaptability and resistance, such aspects also should account for achieving One Health [60].

Besides, the production cycle of animal based food products is of great meaning for its quality [61,62]. Thereby the consumers should be aware of the quality of the foods of animal origin in their own decision-making. The consumers' choices many times are related to the development degree of a country. Even if Romania had registered an increment of the HDI (Human Development Index) scoring from a value of 0.703 in 1990 up to 0.821 in 2021, being raked as a middle power for the international affairs sector [63], next to its great agricultural potential [37], our country still needs to face the challenges of the present and to make substantial progress. Romania sights a great potential for producing high quality and healthy food of animal origin in a sustainable manner based on its genetic resources and animal farming systems, enabling natural resources, climate and biodiversity preservation [64,65]. Many small farm holdings are still active in Romania`s villages providing models for producing high quality and healthy animal products traditionally. Therefore, animal based products from local breeds and local varieties could be better preserved and obtained by

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attaining higher standard for animal welfare, environment and human health [33–35,65]. Withal, the grazing, which is mostly used for ruminants feeding, shows important co-benefits for the flora diversity of the pastures and the local traditional landscape preservation; thus prevents local habitats and ecosystems destruction [66–71]. Beyond this, animal grazing and crops production for animal feeding is linked to the emergence of new zoonotic disease [72].

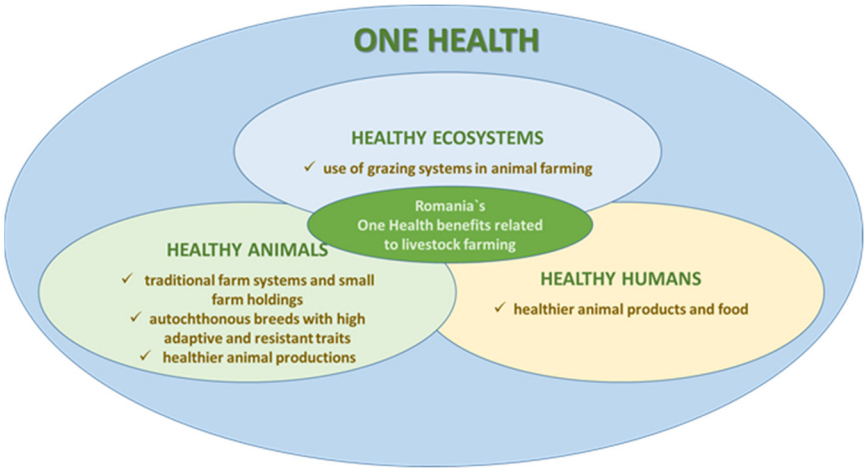

Figure 1. One Health benefits related to livestock farming in Romania.

Starting from the 90`s Romania had to face a consistent and continuously decline regarding the number of farm animals. The statistical data of 2020 indicated that Romania had 31.8% of farms i.e., 2.9 million, from a total of 9.1 million farms registered in the EU, apart from registering a high number of small farms, that is 90.3% or 2.6 million farms with less than 5 ha, but which accounted only in a low percent (3.3%) to the standard output of the EU [73]. Many of the livestock farm holdings found in Romania are family farms, although intensive farming systems are increasing, underling a current burden of scale and farming practice, especially the northern part of the country; this change might be explained by the development requirements of farmers and of upscaling farms, facilitated also by financial supporting measures [66,67]. Also, herdbook or flockbook registration of farm animals is required to access financial support for rearing local endangered breeds [14], yet livestock registration is ongoing growing trend and practice difficulties to overtake. Beyond these, the access to reproductive livestock from autochthon breeds showing genetic and productive performances characterization is a current concern for local breeds farming.

The farm scale is known as a driver of biodiversity loss or keeping, meanwhile small farming scale might be a threat due to lower productivity, lower incomes and high efforts [74]. At the same time land pasture is mostly used to feed sheep and goats; land pasture is used also in cows, mainly those farmed for meat production or in a traditionally manner.

Wilde animals as a reservoir of pathogens for farm animals and humans requires adequate measures to limit the spread of specific infection agents. Despite the fact that the diseases found in wild animals may be considered a threat for few species, their pathogens are able to generate a serious impact, especially when their effect converge with that of other drivers e.g., changes in climate, habitat, pollution, number of invasive species and others [75]. Breakoff of the transmission routes of such pathogens brings together scientific knowledge and socio-political measures in collaborative and cooperation at local, regional or sometimes even global level [8]. On the other side, small animal farm holdings are still found in large number in Romania`s villages and additionally, agriculture and livestock farming for many communities is the only source of incomes.

The COVID-19 pandemics exposed to risks and threats animal husbandry sector also in our country; governmental measures were implemented by giving financial support to animal farm holdings to outbalance the economic crisis and to overcome the decrement of farm animals and holdings.

In the last years, Romania had to deal with the African swine fever, which caused considerable damage also in small farming communities, affecting their incomes although it is harmless for

humans, meat consumption from affected pigs is not allowed, thus limiting the viral agent spread. Most of the small farmers from Romanian villages are raising pigs for self-consumption or for family members' consumption either from financial consideration or self-choice preference [30]. Moreover, traditional local products of animal origin in pigs require specific meat characteristics, Mangalica and Bazna breeds being preferred for producing tastier and higher quality meat products. Romanian population from villages had to face a difficult period of their life, which was affected by the transmission of this viral agent from wild pigs to the domestic ones. Besides, Mangalica and Bazna breeds were in focus in the national program of conservation intended to revive these pig breeds among small farmers and to limit their effectives decrease. Local and competent authorities i.e., Directorates or County Offices from National Sanitary Veterinary and Food Safety Authority, the Directorate of Agriculture, The National Agency of Animal Husbandry ``Prof.dr.G.K. Constantinescu`` of city hall, co-worked and joined efforts for managing such situations in the infected zones, and surrounding areas. Romania`s experience disclose that local and state competent authorities' role is priming in finding out optimal solutions and applying the best management. The competent authorities for animal diseases in our country is the National Sanitary Veterinary and Food Safety Authority in Romania, compiling the General Directorate for Official Controls—Service for the Identification and Registration of Animals, the General Directorate for Animal Health and Welfare—Service for Control of Diseases [76]. As well, international collaboration and cooperation might be very helpful, especially in the case of the countries lacking experience or dealing with facilities or infrastructure deficits.

The adaptive and resistance traits of our local breeds are playing an important role in limiting antimicrobial resistance, spinning over environment heath, animal based foods safety and security. The national strategies of supporting autochthonous breeds i.e., Romanian Spotted Cattle, Mangalica, Bazna and others assert and promote health at national level, thus concurring to global health plans. As well, the actual context of animal farming in Romania could be a feasible alternative for applying One Health approaches. The historical overview of One Health in our country stand for the progress made in promoting, planning and implementing Romania's One Health, by means of active partners as associations, academic and research institutions [77–79]. Our country should find its own way towards a sustainable livestock farming, following similar models or novel adapted ones [80,81].

Romania`s financial support for livestock farming

EU funds are crucial items for supporting countries to attain successful implementation of environmental policies targeting 2030 goals [82].

From 2007, when Romania joined the EU, the gate was opened for having access to direct financial supporting programs for rural development. Mainly the most common financial support in animal husbandry was granted by means of transitional national aid and coupled support schemes [83], next to specific agro-environment and climate measure (i.e., Measure 10 or M.10), which included about 11 Packages for valid compensatory payments. The most relevant for livestock conservation is Package 8, addressed to the local and endangered farm animal breeds from Romania in sheep, goat, bovine, equine and swine [84]. Anyway, many times the farmers had faced difficulties in accessing funding throughout this measure based on the current issues related to implementing and assuming the contractual imposed infield conditions i.e., the procurement of pure breed livestock reproducers having origin and breeding value evidence documents, the genealogical register recording in primary section, other specific eco—conditionality requirements and eligibility conditions such as that of maintaining for a 5 years' period the number of the breeding females until at the end of the commitment, as well as the female offspring required for livestock replacement. Besides, Package 6—important meadows for butterflies (Maculinea sp.) was available for specific areas of the country. In the context of the economic crisis generated by the COVID-19 pandemic, state aid and financial measures were active to support farmers. More, state aid is provided to support the activity of farmers in the context of the crisis caused by Russia's aggression against Ukraine, that is showing great impact on Romania`s agriculture [64,84]. Some of Romania`s farmers are barely

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subsisting in this unprecedented situation making great efforts to pass through. Despite all these, the financial supporting measures are still deficient in some species, with all related concerns.

Starting from 2017, financial support was granted for also for Measure 10—agro-environment and climate, the direct payments for it showing an increase in the last years (Table 1).

Table 1. The amounts of payments authorized for Measure 10—agro-environment and climate during 2017-2022 by the Agency for Payments and Intervention in Agriculture.

Year	Total amount (million euros)	Source
2017	174,06	[85]
2018	109,31	[86]
2019	148.129.011,05	[87]
2020	155.831.603,06	[88]
2021	174,135,506.70	[89]
2022	17.939.846,27	[90]

* according the official data reported on the activity reports per year.

The national efforts to stimulate the use and the conservation of local endangered breeds aimed to respond to the necessity of sustainable agriculture adaptation for an efficient management of natural resources (water, soil and air) and biodiversity conservation. Moreover, the extensive system of traditional livestock farming using local breeds, which is very common in Romania is a sustainable agricultural practice that effectively manages the native animal genetic resources.

According to the national Strategic Plan 2023–2027 significant support (i.e., 41% of the total rural development budget) should be related for encouraging environmentally friendly practices in areas classified as of high natural value, such as those vital for birds and butterflies, positive forecasts being indicated to be expected for such practices implementation by the farmers [19,64]. Yet, it still remains to address the influence of the green transition, along with the ongoing and upcoming needed reforms. More effort in educating the consumers of animal based foods and the end users of animal primary productions, which is still needed, might drive to the increase the awareness when choosing animal origin products or quality based primary production for processing. Organic livestock farming supporting plans stand for such purposes.

The interactions between animal farming and the environments are still requiring further studies and attention, particularly in developing environmental friendly measures for animal production systems and the decision-making process at all levels, as well as international. Romania`s initiatives in the livestock farming area are towards the One Health Joint Plan of Action (2022–2026) goals, agreed by the Quadripartite Organizations [22]. The actual framework of animal farming and policies in Romania aim to meet the criteria of the global requests, by advancing measures of preventing pandemics and endorsing health sustainability; the implementation of One Health approaches in Romanian animal farms are able to promote such goals, especially considering the actual state of animal farming and its potential to drive to an improved health.

5. Conclusions

The present study highlight that Romania`s small-scale livestock farming and its genetic resources, despite the difficult barriers faced for meeting eligibility criteria to be involved in livestock related and rural development programs already defined, may show a realistic potential for further development to be an important part of sustainable animal husbandry, in line with the sustainable development goals referred globally.

A special attention should be paid to the implementation practices, that are indicated to be a key player in Romanian farmers' choices related to sustainable livestock farming, farmer satisfaction targets being mandatory. Specific market strategies and policies supporting the animal based products obtained from local breeds primary production is essential to promote and preserve local genetic livestock resources and might serve also to add value or to enhance product quality. Product

development is also very important to sustain such goals, next to livestock farms certification i.e., ecological, product environmental certification and labeling (i.e., bio, eco, organic, premium, etc.).

An improved and continued infield technical and financial support, aside with more effective communication, educational and research efforts relying on local resources valorization might ensure enhancement in the implementation of livestock farming and breeding strategies and policies, based on adapted specific needs of Romanian` farmers and the actual status of livestock faming. All these should be directed to meet the global sustainable goals adopted, but still requiring progress in terms of implementation.

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