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INCREASING CONFLICT BETWEEN PREDATOR PROTECTION AND PASTORAL FARMING IN THE CZECH REPUBLIC

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Abstract: This paper aims to point out the impacts of the clash between the villagers and the progressively expanding wild predators in the cultivated landscape. The topic was developed as a result of a conflict in the district of Broumov, which ended up in a legal action brought against the Czech Republic. The authors of this paper focus on comparing clashing opinions of various interest groups, discussions towards solving the problem and the effective use of public resources. The livestock farmers insist that the wolves no longer need the degree of protection that is currently applied. The attitude of independent conservationists is based on the assumption that a wolf is a beneficial animal and its population and the area where it lives cannot be limited. Government bodies in charge of the landscape and nature conservation suggest measures aimed to help the affected farmers to secure their herds in a better way, increasing the damages paid and administrative simplification. They accept the possibility of the wolf population regionalisation in the future; however, this depends on progress in the European Parliament and, in particular, on how things will turn out in Germany.

Key words: conflict, conservation, sheep breeding, subsidies, wolf protection

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1. Introduction

Recently, the top predator, the grey wolf (*Canis lupus*), has been spreading in the Czech Republic as dynamically as in other European areas. In mid-November 2017, the European Parliament warned that certain species had already achieved a good degree of protection in some European regions and might currently pose a threat for both the other wild species and farm animals. The coexistence of people and large carnivores, especially wolves, may have an adverse impact on the sustainable development of ecosystems and populated rural areas in some regions, especially in terms of traditional farming and sustainable tourism as well as in other social and

economic activities (EP 2017). The government policies in the US and the European Union currently allow the animals to recolonize as many areas as possible (Mech 2017). The livestock farmers insist that the wolves no longer need the degree of protection that is currently applied and are asking for the establishment of areas where they will be protected (Parliament of the Czech Republic 2018).

Agriculture has been forming the landscape character for a long period of time and the agricultural landscape cultivated by pastoralism is potentially valuable for future production, tourism and environmental perspectives. Pastoralism contributes to increasing the economic and aesthetic value of landscape. Unless maintained permanently, there is a risk of overgrowing the grazing land and the worsening of terrain continuity. The restoration of good quality grazing land will only be possible after making great efforts and such a situation has become a real threat (Hinojosa et al. 2018). Vast pastures make a significant contribution to the protection of non-forest biotopes of pastures and meadows which facilitate the high gamma landscape biodiversity (Metera et al. 2010). Recent decades, however, have seen sheep breeding almost disappear from many areas in Central Europe (Martinát et al. 2008, Niznikowski et al. 2006). The reduction or elimination of sheep grazing in the Czech Republic will result in further deterioration of valuable grassland of biotopes and the disappearance of a wide range of biotopes of rare plant and animal species of European importance (Krahulec et al. 2001). Restoration of the aesthetic landscape must be based on a more rational balance of all factors affecting its character. The sustainable harmonious landscape of value can be restored only by ensuring that the land owners will permanently benefit from their land. Reckless promotion of one factor at the expense of the other may result in totally unforeseeable impacts. The agricultural added value is formed by the rational cultivation of the landscape and the production of good quality products. The small and medium-sized farms are usually owned by the people who have been linked to a given region for many previous generations and the profits they generate largely remain in the region as well. Put in simple terms, what these people take from their land, they give it back somehow. A few user types can be identified in the landscape, which naturally results in the conflicts of groups of interest that are also recipients of subsidies. Relations among them are affected especially by their rights in property and rights to use. Negative trends in the relationship between the landscape user and preserving the landscape's potential give rise to the public controversy. Unless they undermine the harmony of landscape systems, it is necessary to opt for the producers.

The livestock depletion by large carnivores entails economic losses to farmers in many parts of the world (Baker et al. 2008, Gren et al. 2018, Ramler et al. 2014, Sommers et al. 2010). The carnivorous species conservation policy has been intensively addressed in recent decades. Large carnivores, such as bear, lynx and wolf, are protected in the Czech Republic under Act No. 114/1992 Sb. on the landscape and nature protection. Pursuant to the Czech Regulation No. 395/1992, the grey wolf and the brown bear are classified as critically endangered species, while the Eurasian lynx is classified as a seriously endangered species. The increased legal protection of large carnivores leads to their growing numbers even in the areas of high

population density, higher intensity of agricultural production and high populations of other animals (Linnell et al. 2001). Both the risk of attacks on the livestock and the associated costs are increasing, which results in the conflicts between the interests of protectionists and the livestock owners (Dickman 2010, Johansson et al. 2012, Naughton-Treves et al. 2003, Redpath et al. 2013, Young et al. 2010). The policies in support of the nature conservation laws are often introduced to reduce the economic risks for individual business entities, to increase tolerance towards carnivores and to decrease incentives for illegal hunting (Nyhus et al. 2005). The policy instruments include the compensation for the damage caused by wild animals; subsidies for preventive measures; territorial regulations restricting, for example, the use of land or the hunting of carnivores; revenue-sharing systems; and payments for protection (Treves and Karanth 2003, Dickman et al. 2011, Zabel et al. 2014). In practice, however, damage is relatively rarely reimbursed to the farmers who have experienced an attack by carnivores. Unless the compensation reimburses the total costs, economic consequences for these farmers may be significant (Broberg and Brännlund 2008).

The most frequently attacked animal is sheep, e.g. approximately 500 sheep are killed or hurt – injured? in Sweden every year (Elofsson et al. 2015). In France, 1,940 attacks by wolves are monitored on average per year, representing around 7,200 dead or hurt – injured? sheep. Between 2010 and 2015, the average damages amounted to EUR 2,200 million a year (MEEM 2016). The people's attitudes to large carnivores vary but are very often negative (Kaltenborn et al. 1999). The risk of attacks on domestic animals may be affected by the quantity of carnivores (Kaartinen et al. 2009) and the abundance and availability of farm animals in a certain region (Meriggi and Lovari 1996). It arises from the environmental literature that the destruction of farm animals depends on predators' preferences, availability of an alternative wild prey (Barja 2009, Gula 2008, Khorozyan et al. 2015, Sidorovich et al. 2003), exposure of farm animals to attacks by carnivores (Otstavel et al. 2009), and the management of predator populations (Wielgus and Peebles 2014). Wolves kill more animals during a single attack, attack repeatedly and leave behind a considerable share of carcasses unconsumed (Elofsson et al. 2015, Muhly et al. 2010). The social dimension of conflicts between people and beasts of prey show that attacks on the livestock are only one of the reasons for such conflicts. Other reasons include the fear of predators (Johansson et al. 2012), attacks on game animals and the killing of hunting dogs (Swenson and Andrén 2005), insufficient information, unfair planning and conservation processes or processes fostering strategic behaviour of stakeholders (Redpath et al. 2013, von Essen and Hansen 2015) and a tension between towns and the countryside (Skonhoft 2017, Broberg and Brännlund 2008).

Some former studies (by e.g. Kaczensky 1996, Swenson and Andrén 2005) present that the extent of damage caused to the livestock by all three species of carnivores has not been significant so far, but the level of deterioration varies depending on local conditions. Also Kovařík, Kutal, and Machar (2014), who did their research in the Beskydy area in 2012, claim that the annual frequency of attacks was very low and that the main economic factor, as seen from the sheep breeders'

perspective, is low consumer demand for ovine products and not the presence of large carnivores. The present situation, however, is rapidly changing and the relevant data (Linnell and Cretois 2018, Franceinfo 2018, WNON 2018, Jönsson 2015) vary. Damage caused by wolves, the amounts of associated compensation and the subsidies for preventive protective measures is growing as dynamically as wolves are spreading (Kontaktbüro "Wölfe in Sachsen" 2018, Fédération Nationale Ovine 2015).

According to the participants in the agricultural sector, the changes in land use and economy in agriculture brought about by the presence of wolves are mostly ignored by policy makers. The policies focused on the presence of wolves mainly concentrate on coping with damage caused to the livestock by wolves. The agriculture and the conservation alignment requires approaches which integrate the societal concerns about compromises in environmental development (Sayer et al. 2013, McShane et al. 2011).

The frequently used argument for the presence of large carnivores in the countryside can be expressed by the term 'biological balance of the ecosystem'. Robert O'Neill (2001) summarizes his objections to the ecosystem concept. The mechanistic vision of ecosystems provided the conservationist organizations with comprehensible arguments. If the natural systems work as machines and a human destroys them, they will logically stop working. But the natural systems are out of balance, open and heterogeneous. The natural balance is a myth and its idea can no longer serve as a basis for nature protection (O'Neill, and Kahn 2000). All populations have formed as a result of natural selection processes and natural selection has an influence on their interactions. The ecology which omits evolution cannot work (Nicolson 2001) and ideological distortion damages conservation more than true information (Middleton 2014, ACCUWEATHER 2018). Perhaps the most important result of the traditional ecosystem concept is our view of human society. Homo sapiens are not an external disruption, they are a key species within the system (O'Neill 2001). A human being may be included, albeit with paradoxical consequences, in the ecosystem concept when the intensively cultivated agricultural landscape becomes the most stable 'climax' (Hošek and Storch 1999, Konvička 2002). Balance will not happen in the cultivated landscape – the countryside is just in stalemate which resembles balance. In the case of deflection of one of the sides, i.e. suppression of farming, an early intervention must be carried out as after a certain lapse of time it will be hardly feasible. Besides that, spending money on mutually antagonistic goals does no good.

This paper aims to point out the impacts of the clash between villagers and the progressively expanding wild predator in cultivated landscapes and to open a scientific discussion to this end. The problem, so far perceived in the Czech Republic as marginal, will undoubtedly continue to grow in the near future as indicated by the development in and experience from other European areas. The topic was developed as a result of the conflict in the district of Broumov, which ended up in a legal action brought against the state requiring government bodies to prevent damage to livestock and to actively hinder cruelty to animals. The legal action rejected on formal grounds by the competent court was filed by sheep breeders in early 2018.

The authors of this paper concentrate on comparing the clashing opinions of various groups of interest, discussions towards tackling the problem and the effective use of public resources. The authors compiled and analysed the official opinions of the involved institutions, which were taken from their websites, news, minutes of the European Parliament and the Parliament of the Czech Republic as well as the opinions of individuals (environmentalists, farmers, hunters) provided by way of answers to questions or presented in the press. Opinions of the general public, taken from the public discussions of newspaper articles addressing the given topic over the last two years (2017 and 2018), were analysed as well.

2. Considerations

It is necessary to map many questions raised in discussions and the suggestions of real possible solutions to the problem. In this paper, the authors strive to define the main questions that are raised in discussions and clashing opinions of the interest groups. The structure of the paper starts with the wolf introduction, its population expansion and protection. The authors want to point out the economic relationships between sheep breeding and the protection of wolves, including the impacts of behavioural economics as well as psychological impacts and risks for farmers. The authors analyse the discussions about the recommended preventive measures towards livestock protection against the predator and the opinions of the general public in relation to the problem.

Land use by a few entities at the same time logically accounts for many problems and encounters difficulties in terms of the property rights and the interests of users. Disparities can also be found in contradictory funding activities in the landscape, which results in impairing their effectiveness. Both property rights and environmental protection are in the public interest and are guaranteed by the state. The conflicts between these two public interests in real life are consequently beyond doubt and natural.

Legislation is represented by the laws on the protection of the landscape and protected animals, which are based on a certain situation which fails to reflect the changes and to specify the population where the status of a critically endangered species can be altered. It, basically, relies on the sort of self-regulatory function of nature.

Nature and landscape protection institutions, as well as the environmentally-oriented schools consider the spread of predators as a natural phenomenon and an inevitable process. Large beasts of prey are referred to as being a part of megafauna and the ecosystem engineers claim that the landscape will not work without these animals. The institute of nature conservation is politically supported and, as such, it brings significant financial means, including money for training, public events and promotion. An important question is whether all independent protectionists involved have an appropriate education and, especially, whether they are competent to make important decisions in terms of the landscape functions and to communicate

unbiased information. Their independence or dependence is usually affected by the donors, especially if their livelihoods depend on them.

Subsidies designed for a number of counteracting activities can be regarded as a negative phenomenon. The costs are increased with a negative effect. The economic context can be expressed as a development in the field of subsidies provided for wild species protection, development in the field of subsidies granted for the preservation of pastures and the aid of grazing livestock and the development in the field of compensation for damage caused by predators. Since the actual damage is usually well above the reimbursed damage, we cannot quantify the latter.

Psychological aspects, especially the feelings of a farmer, his family and employees stemming from their frustrated efforts, compassion for the suffering of the animals attacked, fears and restriction of free movement in the countryside, are underestimated. The damage as a result of a protected predator attack may be borne by the farmer on the grounds of insufficient securing of the livestock or the complexity of proving the species of an attacker. Such situations may lead to the sudden abandoning of farming, an increase in social expenditure, i.e. overgrowing of traditional grazing land and poorly accessible areas, changes in the landscape character and aesthetic values of the landscape and the biotope changes, being the biggest problem in Europe.

3. Expansion and protection of wolves

In the Middle Ages, the wolf populations were not abundant in Bohemia and Moravia. The wolf population in the 17th century was likely to have achieved the highest number in the territory of today's Czech Republic. The number of wolves hunted quickly increased from the early 18th century, and there was practically no viable wolf population in Bohemia in the 19th century (Bufka et al. 2005). Wolves used to live almost continuously in the Beskydy region until 1914. Individual wolves began to reappear again after 1947. Wolves from Slovakia, Poland and Germany have gradually and spontaneously spread in the territory of the Czech Republic. The Documentation and Counselling Centre of the Federation of the Wolf (DBBW) in Germany states that the wolf population throughout Germany in the 2014/2015 season amounted to 31 reproducing wolf packs, of which 10 packs were observed in the Land of Saxony only. DBBW currently records 73 packs of wolves in Germany (DBBW 2019).

It is difficult to determine the exact number of wolves in the Czech Republic as the sources vary considerably. Since 2014, however, a lot of new appearances have been reported (Figure 1). According to the Nature Conservation Agency (AOPK) of the Czech Republic, about ten wolf packs and five couples without young are currently present in the Czech Republic territory (Figure 1). The Czech Statistical Office (CSU) conducts a survey of the occurrence of wildlife and game management by means of the Annual Report on Hunting Grounds and the Game Population and Hunting (for a period from 1st April of a given year to 31st March of the following

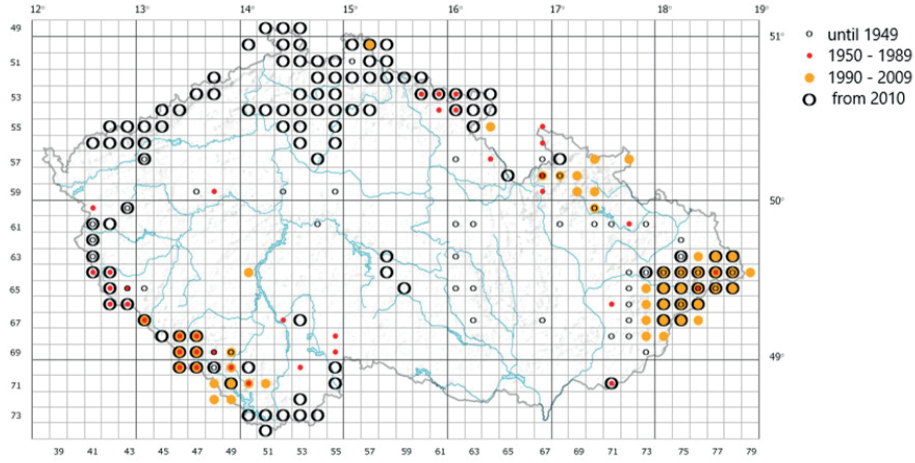

Figure 1. Occurrence of *Canis lupus*.
Source: AOPK CR – Finding Database of Nature Conservation (basic data of the State Administration of Land Surveying and Cadastre, updated on 3rd February 2019).

year). The data for the entire Czech Republic are published. Protected species of fauna are included. Based on the results of this survey, the population of wolves was relatively steady – around 10 animals – by 2014. After 2014, the number sharply increased (Table 1). In view of the giant physical activity of migrating wolves, it is necessary to note that some appearances are of a random character and do not represent the continuous presence of wolves. The trend is, however, indisputable and corresponds to the growing volume of damage and expansion of wolf population in neighbouring countries.

Table 1. Development of the incidence of the Eurasian wolf in the hunting grounds in the Czech Republic; source: CSU

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Wolfs (heads)	6	6	3	10	5	13	30	61	118

Source: CSU

The wolf, as an animal of special protection, is, pursuant to Act No. 114/1992 Sb. on the landscape and nature protection (ZOPK), as amended, protected in all of its developmental stages. The grounds for protection and the status of a critically endangered species was attributed to wolves in a certain situation which is evolving. The limits when the reasons for the absolute protection will no longer exist are, however, not determined. Wolf protection in Europe is subject to what is going on in

border areas and to the policy of governments. The wolf status in the EU countries is defined in the Habitat and Bird Directive, where the wolf is ranked in Annex II (requires designation of protected sites for the wolf) and Annex IV (strict species protection, with the exception pursuant to Article 16 – hunting under precisely defined conditions). The exception is Bulgaria (the wolf is ranked in Annex V, i.e. it can be subject to regulatory measures), Estonia, Lithuania, Latvia and Greece north of the 39th parallel (only in Annex V), Finland (the wolf is not ranked in Annex II; within the reindeer management area it is in Annex V only), Poland, Slovakia and Spain north of the Duero river (the wolf is ranked in Annex V instead of Annex IV). In the non-EU countries, Norway and Switzerland, the wolf is protected under the Berne Convention only, which requires the action plan to be accepted for the wolf. It follows from the above that the majority of countries may allow a certain form of regulatory hunting of wolves (Lešová and Antal 2015). Table 2 shows the indicative wolf populations and comparisons of the area and population density in the European countries. The Czech Republic is, after Germany and Italy, the most densely populated country. The highest density of wolf population is in southern European countries. A certain form of regulatory hunting is allowed in the majority of these countries. What is more, illegal hunting is very frequent, especially where the damage compensation system does not work. There is also a very high risk of hybridisation here (Lešová and Antal 2015). The problem is uncompromising abidance in the existing degree of protection which ignores the new evolutionary trend throughout Europe, including the documents and recommendations of even the European Parliament as to the degree of protection of the agricultural landscape from wolf attacks (EP 2017), whilst funding of the problem grows tremendously and achieves incredible proportions.

4. Economic aspects

This is the issue where the financial indicators have a unique explanatory power but they reflect the past (they are known only after the accounting period is over) and neglect long-term objectives and other circumstances under which the monitored indicators have been obtained. They therefore should be placed in both the environmental and social context. In our case, it is an especially broad range. Although the financial aspect runs through all events related to this topic, it stems from production and other activities. The production activity is linked to the landscape upkeep.

In 2008 and 2016, the sheep population in the Czech Republic was 186 thousand and 218 thousand, respectively. The production in constant prices has been growing in recent years (Figure 2).

Based on the results of the FADN (The Farm Accountancy Data Network) survey, the economic size of sheep-breeding farms has declined in the Czech Republic recently and is lower than the EU average. The area of farm land used and the area used for growing fodder crops in hectares have been reduced as a result of the

Table 2. Comparison of wolf populations, area and population density of European countries

Country	Number of wolves*	Area (km^2)	Number of inhabitants	Wolf density (pcs /1000 km^2)	Population density (population /km^2)
Albania	250	28,748	2 821,997	8.70	98.16
Bulgaria	1,200	110,994	7 050,034	10.81	63.52
Czech Republic	60	78,866	10 578,820	0.76	134.14
Estonia	200	45,339	1 306,574	4.41	28.82
Finland	180	338,432	5 535,400	0.53	16.36
France	300	543,965	65 065,189	0.55	119.61
Croatia	200	56,542	4 171,954	3.54	73.79
Italy	700	301,338	60 507,590	2.32	200.80
Lithuania	400	65,200	2 819,753	6.13	43.25
Latvia	600	64,589	1 934,218	9.29	29.95
Hungary	250	93,036	9 712,887	2.69	104.40
Germany	500	357,023	82 358,185	1.4	230.68
Norway	100	385,199	5 320,143	0.26	13.81
Poland	2,500	312,679	38 433,600	8.00	122.92
Portugal	300	92,391	10 839,514	3.25	117.32
Romania	2,500	238,391	19 653,136	10.49	82.44
Greece	700	131,948	11 152,158	5.31	84.52
Slovakia	400	49,036	5 441,899	8.16	110.98
Slovenia	60	20,273	2 061,085	2.96	101.67
Serbia	500	88,361	8 772,209	5.66	99.28
Spain	2,500	504,782	48 958,159	4.95	96.99
Sweden	400	449,964	10 182,291	0.89	22.63

Source: Authors

*Note: Wolf populations in individual countries are indicative only; the data are based on various sources. The situation changes quickly and some data are obsolete.

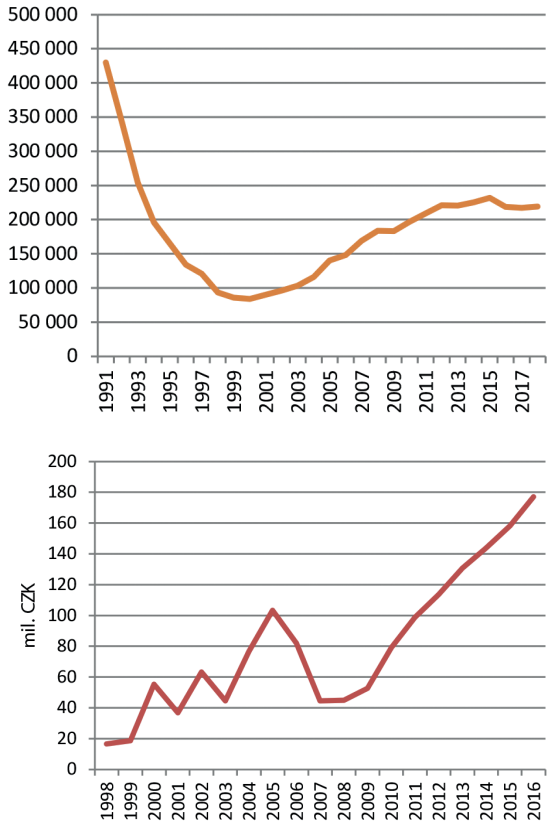

Figure 2. Trend in the sheep and goat populations (in heads) and the production in constant prices in the Czech Republic in 2000. Source: CSU.

growing number of small farms (Table 3). In comparison with the EU average, the area covered by sheep-breeding farms is above average. The decreasing number of livestock units per the farm's area shows that the numbers of kept animals have grown more slowly than the quantity of farms focusing on their breeding. The profit/loss per farm has not changed much in time and ranges above the EU average. The expenses ratio decreases, although it is higher than 1 in all of the monitored years and exceeds the EU average. The return on assets is above average. The indebtedness of sheep-breeding farms has been growing, which may be associated with the expansion of breeding and an increase in the number of small farms focusing on this activity. Current liquidity continues its upward movement and the labour productivity is increasing too, although it is still below the EU's average. Subsidies converted to farm land used have decreased in recent years, but the profit/loss converted to hectare has increased, which demonstrates the improving economy of farms and their decreasing reliance on subsidies. The growing production in constant prices reflects the increasing interest of consumers in organic products in the sector. It is a return to a more natural utilisation of sources, that is environmentally-friendly and enriches the countryside.

Table 3. Development of economic indicators of an average farm specializing in sheep and goat breeding in the Czech Republic

(48) Specialist sheep and goats	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Utilised Agricultural Area (ha)	94.81	146.22	91.01	69.92	84.01	59.43	56.02	61.18	50.25
Forage crops (ha)	90.31	141.3	87.76	65.05	71.45	53.93	48.51	53.62	45.9
Total livestock units (LU)	35.45	48.04	33.54	27.4	29.32	22.72	22.31	26.32	22.93
Sheep and goats-LU	7.04	19.38	11.78	11.15	12.94	12.05	12.83	14.43	14.74
Stocking density (LU/ha)	0.327	0.285	0.306	0.322	0.344	0.345	0.399	0.406	0.441
Production of sheep and goats (EURO/LU)	311.1	273.8	445.6	732.3	451.8	461.8	445.2	462.6	441.0
Production of ewes' and goats' milk (EURO/LU)	280.4	362.0	394.6	294.7	389.9	596.6	903.4	1036.0	983.6
Cost/revenue ratio	1.8	2.0	1.9	1.4	1.7	1.4	1.4	1.3	1.2
Profit before taxes (EURO)	17825	29817	20775	24596	23804	21744	18264	18013	17471
Profit before taxes (EURO/ha)	188.0	203.9	228.3	351.8	283.3	365.9	326.0	294.4	347.7
Subsidies-excluding on investments (EURO/ha)	494.7	541.0	579.8	580.1	587.3	565.0	567.4	559.0	512.4
Subsidies sheep & goats (EURO/LU)	58.9	47.0	42.6	25.1	68.7	69.7	138.6	141.7	130.1
ROA	11.4	13.2	12.3	12.9	11.6	13.8	6.6	10.6	12.1
Indebtedness	7.0	16.2	16.8	11.9	12.2	11.2	7.4	12.0	16.7
Current liquidity	3.6	5.2	3.9	45.2	5.7	8.9	34.8	6.2	4.1
Labour productivity (EURO/AWU)	19112	16275	18859	20764	15605	16142	19179	20881	20598

Source: FADN

Further development and higher numbers of kept animals are hindered by both the relatively low economic efficiency and, in specific locations, the occurrence of predators. Abandoning the pastoral farming of sheep brings about changes in and deterioration of a wide range of biotopes. Liquidation of the livestock by large carnivores entails economic losses to farmers in many parts of the world. In their paper, Widman and Elofsson (2018) analyse the cost of damage caused by the beasts of prey in Sweden. The costs of compensations for the livestock killed by large carnivores are provided for attacks by the brown bear *(Ursus arctos),* the wolf *(Canis lupus)* and the Eurasian lynx *(Lynx lynx)*. According to their results, an increase in the density of carnivores by 1% leads to an increase in the cost of compensation by 0.3 to 0.4%, whilst an increase in the sheep stock density by 1% results in increasing the cost of compensation by 0.8% in the case of the brown bear and by 1.1% in the case of wolves.

The regression analysis based on available data of the trend in the wolf population in the Czech Republic hunting grounds (CSU 2018) and the trend in the compensations of damage caused by wolves (Ministry of Finance 2018) prove a high statistical dependence ($rP^2P = 0.9925$) between the trend of wolf occurrence in the Czech Republic territory and the trend in compensations paid for damage of the livestock caused by wolves. Considering the current amount of compensation of damage caused by wolves, an increase in the wolf population by 1 will result in the growth of compensations of damage by almost 13.5 thousand CZK a year. The model presented at the conference (Lososová et al. 2018) predicted the compensations in 2018 upon the regression equation and the current occurrence of wolves in the hunting grounds to CZK 1,499 thousand. As it turned out, the model predicted the costs with an accuracy of 96.5%, as the real costs, as of 10 December 2018 (Parliament of the Czech Republic 2019), amounted to CZK 1,554 thousand (Figure 3). Whereas the amount of compensation currently includes only the price of meat and the frequency of attack increases, the amount of compensations in the future is very likely to grow even faster.

As many studies (Laporte et al. 2010, Steele et al. 2013) suggest, the compensation for damage caused by the wolf takes into account only the direct effects of the predator's attack. Both domestic and wild animals may react to predators by changes in their behaviour, such as increased vigilance (Berger et al. 2001, Welp et al. 2004), gathering into groups and changing of the group size (Lima and Dill 1990, Hebblewhite and Pletscher 2002, Creel and Winnie 2005), changes in the choice of their habitats (Creel et al. 2005, Muhly et al. 2010) and various changes in movement patterns (Fortin et al. 2005, Oakleaf et al. 2003, Frair et al. 2005, Fischhoff et al. 2007). The presence of a predator leads to an increase in stress (Grandin 1998), which may result in the livestock being more prone to infections and illnesses (Faries et al. 1997), as well as to miscarriages and premature births and the loss of weight (Voisinet et al. 1997). Risk factors induced by the presence of wolves may therefore ultimately affect the human tolerance to wolves in agricultural areas. Based on the results published in the study by Steele et al. (2013), indirect year-to-year financial impacts of wolf attacks may be as high or even higher than direct impacts.

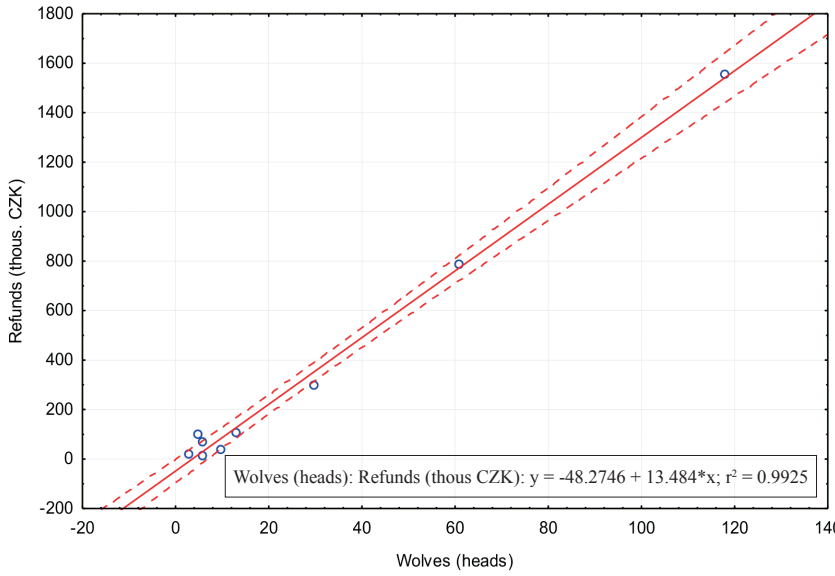

Figure 3. Relationship between the occurrence of wolves and compensations of damage caused by them (2010 – 2018). Source: CSU (occurrence of wolves in hunting grounds); MF CR (trend in compensations of damage caused by wolves)

As the data on wolf occurrence in the Czech Republic can be considered vague, the costs spent by the non-governmental organizations directly on wolf protection and expansion are difficult to obtain. Institutions reluctantly provide the required information, however, these costs include, in addition to monitoring and partly to research, especially public awareness. This is represented almost exclusively by the presentation of the protectionists' views pointing out that the opponents are affected by mythology and stories. Should we want to appraise a wolf upon the costs spent on its protection, we must take into consideration not only the direct costs (financing of the nature conservation institutions, compensation of damage, preventive protection measures), but also indirect costs, such as the lost subsidies due to the loss of kept animals, lost future profits, costs of new livestock acquisition, reduction of the animal performance caused by the stress owing to the near presence of a predator, as well as the costs incurred as a result of the termination of business activity and changes in the landscape upkeep. Also, the market value needs to be reckoned with (based on the price list of poached animals) hunting as not only the overpopulated species and weak animals are hunted. Moreover, losses happen due to the stress and migration of the game or reduced landscape attractiveness for tourism.

At present, the right to subsidies, the method of their utilisation, wasting of resources and the subsidies as a factor distorting the market environment are being discussed. Grants never come for free – something in return is always expected and the money coming from the subsidies is not always effectively managed. It is the eligible costs that are analysed in detail during an audit, not their effectiveness

and a real need for their spending. Subsidies will continue to be geared towards the environmentally cultivated areas; in this context, the agricultural activity is referred to. For example, Pikora and Šichtařová (2017) claim that agriculture will become increasingly environmental-friendly (as acknowledged by impacts of climatic situations, including the water management one). Subsidies make sense if they help to pursue a certain strategic interest. They are sustainable unless they exceed a certain acceptable limit. The pastoral farming of sheep is not profitable. It is carried out on the soils of a low yielding capacity, provides natural upkeep of such land and it supports tourism as a promoted useful activity.

Whilst the subsidies for livestock breeding have always been more or less reckoned with, especially in economically distressed areas, the subsidies to support the expansion of predators have not. It is something new for the current society. The question is to what degree the subsidies for predators represent a strategic interest of the state. If the subsidy is oversized, it may lead to the farmers abandoning their farming land and to the application of construction plans which are comfortable with the spreading of predators (biogas installations, photovoltaic power plants). The price of the agricultural land increases – the 2015 the price was 60% higher than in 2010. In 2016, the price rose by 25% (Pikora and Šichtařová 2017) and as the land price grows, the lease of land increases too (Lososová and Zdeněk 2017). Even if we fully adopt Farming 4.0, the landscape and the need to care for it will remain. In the context of land management, societal effectiveness of subsidies is often being discussed. This value is measurable to a certain degree, including the satisfaction of stakeholders. Although even the system of national accounts (SNA) is adjusted using the sets of environmental data and the data on extraction of natural resources, the GDP indicator reflects the compensations of damage. Effectiveness is a ratio of effects (benefits, outputs) and claims (costs, inputs), which gives rise to certain disadvantages in reporting GDP when the quality of agricultural land and the condition of the landscape are not captured. An agricultural holding is able to take effective care of the land owned by it or entrusted to it. As a result, the state ensures positive externalities by means of subsidies. If the agricultural holding is being wound-up, other additional costs incur (Figure 4). At present, there is no scientific consensus in Europe in terms of the most favourable administration of the abandoned land (Agnoletti 2014, Schnitzler 2014, van der Zanden et al. 2017). The local economic cycle has its own social and environmental impacts. If underestimated, the role of primary production, i.e. agriculture, may backfire harshly (Švihlíková (2015)). The costs related to the interruption or end of livestock breeding and the compensation for landscape maintenance include the costs spent on maintaining the standard (desired) state of biodiversity, water management conditions, soil as a potential production factor, as well as the costs of production restoration under the changing climatic conditions. This begs the question of how far the taxpayers (tourists, farmers) are willing to go to support the upkeep of the countryside in a required form. The inhabitants' willingness to pay (WTP) for these activities is an important factor, as illustrated in the study on the costs and benefits of multifunctional grasslands in the Alps (Raffaelli et al. 2004).

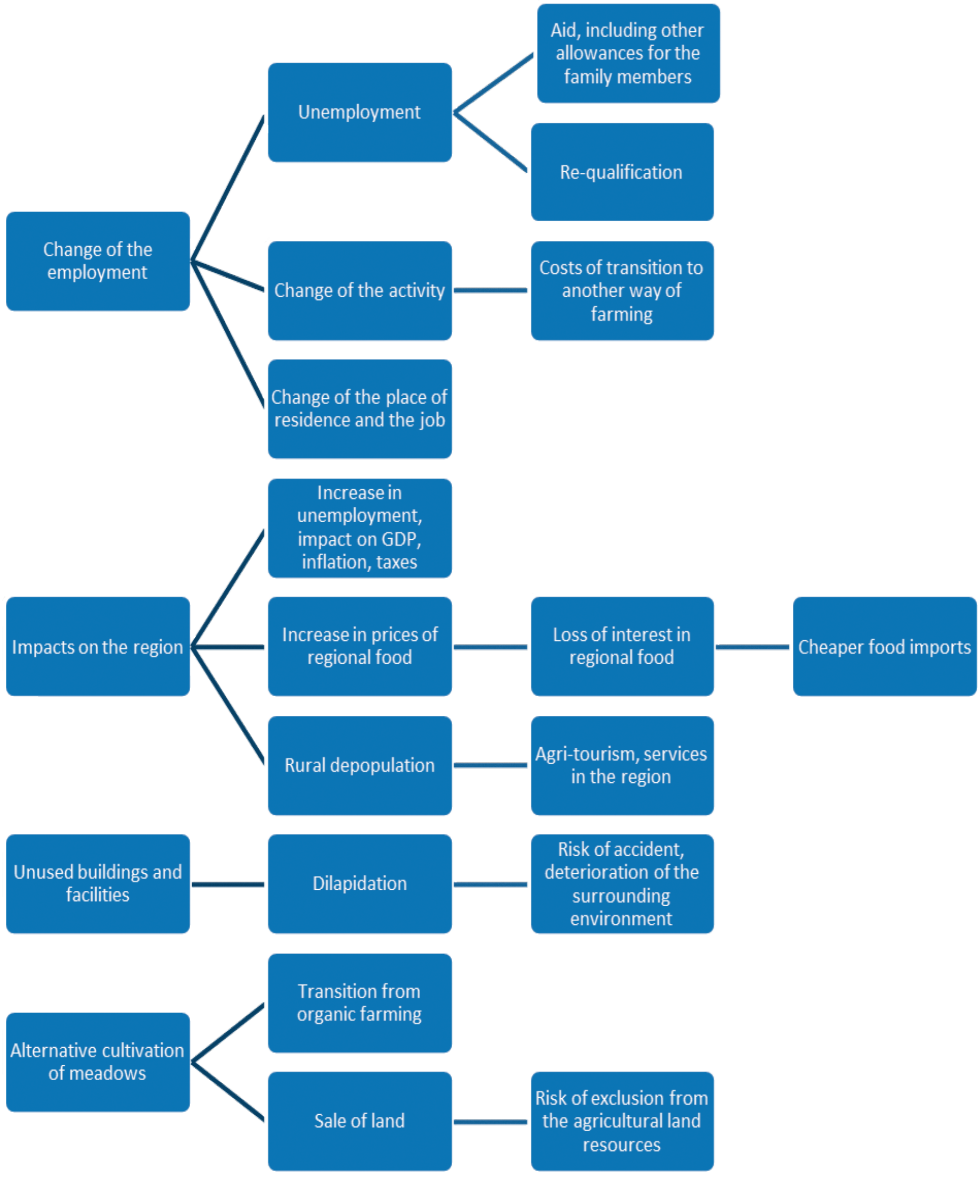

Figure 4. Diagram of impacts induced by a cessation of activity.
Source: Authors.

5. Clashing opinions

5.1. The main arguments put forward by the advocates for the absolute protection of wolves

1. Wolves expand into new European areas naturally. This expansion happens when the territories of their original occurrence are already filled with existing wolf packs. There is no evidence that wolves are artificially released into the Czech countryside.
2. Wolves are needed for the restoration and proper working of the ecosystem. They are necessary to maintain the ecosystem's balance so that the ecosystem could regulate itself.
3. Wolves regulate the overpopulation of game and make game healthier by killing the especially weak and ailing animals.
4. Wolves do no harm; they are elusive animals that avoid people. People are in no danger of attack unless they provoke the beast. The fear of attack on humans stems from the lack of education and unsubstantiated myths and superstitions. Protectionists argue that the last fatal wolf attack on a human in Europe was recorded in Spain in 1974. In other cases, it was proven that these animals had been fed or incited before or that those attacks had been caused by wolf-dog cross-breeds.
5. Wolves raise negative attitudes towards themselves in part of the population (rural people and livestock breeders, hunters) as these people are not ready for a return of this beast of prey to their countryside. Farmers underestimate the protective measures despite the fact that they are provided subsidies for taking thereof.
6. Proposed preventive measures are efficient. The main preventive protection measures recommended are solid fences combined with an electric fence, overnight housing of the livestock and enclosing of the stables with an electric fence. To increase its efficiency, the electric fence may be equipped with an additional cable pulled around the fence on which regularly spaced, red flying pennants are hung to deter the wolves. The permanent presence of sheepdogs, especially for herds with a higher number of animals, is advisable as well. One dog is recommended for about 100 sheep. It is, however, preferable to have two dogs for bigger herds of more than one hundred sheep as the dogs are more self-confident in defending their herd. The possible alternative for smaller husbandry is to have a donkey which often warns against an approaching danger.
7. There is no risk of wolf overpopulation. All organizations dealing with nature conservation thoroughly refuse to debate about a possible controlled culling of beasts of prey in cases of their outbreak and further expansion into the cultivated landscape. Culling of an individual animal may upset the internal wolf pack's hierarchy and lead to its disintegration. The young wolves who have no previous experience with the measures for the herd protection may

then cause even more harm to the livestock. There is no threat of a wolf outbreak as the environment has a certain carrying capacity. If it is exceeded, the self-regulatory mechanisms will start to work. For example, there will be fewer wolf cubs or the wolves will go somewhere else. The natural area of distribution is not and will not be restricted.

5.2. The main arguments put forward by the opponents

Re: Argument 1 above: It is, of course, very difficult to prove that wolves are artificially released in the Czech countryside. Likewise, the evidence to the contrary is not convincing either. The alpha couple has suddenly appeared in the strictly protected area that is, moreover, equipped with installed photo traps. On top of that, there have been testimonies to meeting wolves that were not shy. Unnatural behaviour of some individual beasts of prey and a sudden, very dynamic expansion of wolves in the areas where they have not occurred before for many centuries raise the justified questions, as such a way of spreading appears not to be natural. Occurrences of wolves recorded in the Czech Republic territory were, basically, constant until 2014 and there were no dramatic problems or conflict situations either. As a matter of fact, no important conflicts have been recorded recently in those areas where the wolves appeared regularly (Beskydy); the major conflicts, however, occur in exactly those areas where wolves have not lived for hundreds of years (the district of Broumov). The fact that the wolves have not been expanding into the areas where they are expected to do so (in the Beskydy region from Slovakia) but in unexpected territories raises the justified questions as to their origin. It is questionable whether there is efficient control of legal captive breeding or monitoring of illegal options of breeding in place. The situation may be significantly complicated by finding that up to 60% of the wolf population in Europe is genetically influenced by hybridisation (Pilot et al. 2018), making the change in the predator's behaviour possible.

Re: Argument 2 above: One of the main arguments in favour of an absolute protection of large carnivores is based on the mesopredator release hypothesis and the follow-up hypotheses of trophic cascades caused by large carnivores and the behavioural trophic cascade hypothesis, which are often recognized as environmental laws without convincing evidence. According to the study by Allen et al. (2017), probably due to the poor condition of many carnivore populations and increasing efforts to protect them, many studies tend to ignore or devalue fundamental principles of the scientific method in producing evidence of the ecological roles the carnivores may play. This, however, undermines the trust of the public not only in the science and scientists, but also the reasons for the protection of large carnivores. The frequent example pointing to ignoring of data that fail to confirm the effects of trophic cascades is the studies drawn up in the Greater Yellowstone Ecosystem, USA (Winnie 2014). Large carnivores, undoubtedly, have their impact on the environment. It is represented, basically, by every animal which is eaten or roused by a predator. Whether the death of such prey is good or bad depends on the animal we prefer (Allen et al. 2011,

Mech 2012, Flagel et al. 2016). The question is whether the predator's effects are stronger or more important than the processes running in the bottom-up direction. Do the effects of carnivores always only mean the benefits of biological diversity? Are positive effects of carnivores universal within the ecosystems and are they apparent on all trophic levels? These questions are asked by Allen et al. (2017), who believe that our knowledge to date is not so sophisticated yet, but it is necessary to clearly distinguish the science from promoting political values.

Re: Argument 3 above: According to the members of the Czech and Moravian Hunting Union (CMMJ), the conditions and the numbers of the game in the Czech hunting grounds have been constant for already 40 years. Besides the fact that wolves hunt the game, they mainly make them anxious and, as a result, the game changes its behaviour and territory which may trigger other problems such as the unexpected and major damage to the crops or forest stands. A current problem is the overpopulation of feral pigs which, paradoxically, are not hunted by wolves. A feral pig is a very intelligent animal. In the event of a threat to their security, two or more herds of feral pigs have been observed to get together in order to force the wolf to look for another prey that could be hunted more easily. The wolf expansion entails further risks omitted by the protectionists. These risks include the spread of rabies, hybridisation with dogs as well as the resurgence of diseases and parasites that need both herbivores and carnivores to complete their cycles.

Re: Argument 4 above: The fact that a human is attacked by a wolf relatively rare is, however, not associated with the wolf behaviour but rather with their partial extermination. The wolves that were hunted became very shy and learnt to stay away from people. If they, however, learn that meeting a human does not represent any hazard to them, they will become bolder. In terms of the latest incidents of wolf attacks on humans, the protectionists say that those attacks were provoked or that those animals were ill, and they often 'argue' by referring to much more likely risks (e.g. attack by a dog, hunters' accidents during hunting, tick-borne infections, etc.).

Re: Argument 5 above: No preventive measure is 100% efficient. The electric fence may certainly discourage the wolf. If, however, the sheep stampede at night, the fence may be easily torn. Based on the research by van Liere et al. (2013), there have been no significant differences in the frequency of attacks between the farmers using electric fences and the farmers with ordinary fencing of their grasslands. The views saying that having a sheepdog fully suffices for guarding the herds represent the simplifying and one-size-fits-all approach. Opinions and experience of farmers and prominent dog breeders are far from being affirmative. Training of a good-quality sheepdog is very demanding and is not successful with a majority of puppies of an appropriate breed. The selection of a dog breed, its reaction to the surrounding environment, training and controllability, as well as its predispositions – all of that represents important aspects. Not only the costs of and the demands for buying a good quality dog but also coming to terms with the potential dog's injury or death after an attack by a wolf represent

a problem for farmers. Wolves may even be attracted to the guardian dogs, they may communicate with the dogs socially and fight them in a ritual way without injury (Coppinger et al. 1988). Wolves may also actively search for the dogs in order to kill them. The prevention of wolf attacks by employing these dogs is therefore unclear.

Re: Argument 6 above: The really efficient measure is the two-metre high, solid iron fence embedded in the ground, surrounded with a welded wire mesh and guarded by dogs. All pasture lands, however, cannot be enclosed in this way not only for economic reasons but also from the viewpoint of an aesthetic appearance, landscape continuity and attractiveness for tourism. If a farmer drives the herd into the solid fence or stable every night, he is giving up on conducting breeding work as the herd cannot be separated as it would be necessary from the breeding perspective. Fencing and overnight housing of the livestock increase the costs of feeding. What is more, the sheep cannot graze down the land as they would like to. Herds containing a lot of animals sometimes cannot be confined in a large object. The construction of such an object would again increase the need for investment. At the places where the livestock is housed for a night, wolves have learnt to carry out their attacks in daytime. In such a regime that is several times more labour demanding, the economy ceases to function first.

Re: Argument 7 above: Controlled culling is carried out in many European countries and, in the opinion of many breeders and hunters, it would help keep the beast of prey in less populated areas and the national parks. Those in favour of this solution claim that they do not want to liquidate wolves, but they do not want them to be preferred over other animals and people. They highlight the problematic enforcement of the conservation policy which triggers further problems. A typical example is the case of cormorants causing major damage to fishermen. As long as the cormorant was protected, the government compensated the damage. Once it lost the status of a protected species due to its outbreak, the damage caused by it are no longer reimbursed. The damage was, however, of such a magnitude that the government decided to pay out remunerations for the controlled culling of cormorants. This is a case of inefficiently spent public resources, which may also concern the wolves in the future. The opponents for the absolute protection of wolves include the people most affected by this problem, who live in harmony with nature and really protect it on a daily basis by their work and way of life. The conflicts arising from the expansion of large carnivores' territories are frequently described as a tension between towns and the countryside. The majority of big town/city inhabitants wish the wolves would spread, whilst many rural people are afraid of wolves and they do not like their expansion at all, which results in a significant dispute expansion (Mech 2017). The studies have proven that the degree of wolf tolerance increases with a distance from them (Williams et al. 2002, Karlsson and Sjostrom 2007), i.e. that most people willing to support the spread of wolves live outside of the wolf areas and the degree of tolerance decreases if the people are confronted with wolves (Olson et al. 2015).

5.3. Views of laypersons

The views of the public concerning this topic were evaluated by analysing the public discussions posted under the relevant articles published in the media for the last two years. The main strands of public opinion in the relevant comments in discussions under the articles, their share in the total number and the numbers of affirmative votes of readers were characterized. As the analysis shows, the vast majority of discussants believe that responsibility for the attacks on livestock lies with the farmer. It is the farmer's duty to secure his herd and if an attack happens, preventive measures taken by the farmer were not sufficient. This is the view of 65% of discussants. The prevailing opinion is that the dogs provide sufficient protection or that our ancestors were successful in protecting their herds. None of the discussants have pointed out the fact that our ancestors were those who routed out the wolves.

Another very frequent comment in discussions is represented by the view that wolves belong to our countryside and it is a good thing that they have returned. This view is supported by roughly 15.6% of discussants. Approximately 14% of people believe that wolves do not belong to our densely populated landscape or that the state should decide whether it wants to have the pastures with sheep or wolves. About 4% of commenting readers address the financial aspects of the issue which, however, always concerns the compensations and subsidies for farmers. No discussant has addressed the question of public resources provided for the wolf protection support. Of all discussants, only 2% believe that the area where the wild carnivores will be protected should be defined.

6. Conclusions

The problem referred to as conflicts between humans and wilderness are mostly the conflicts between nature conservation and other human activities, especially those related to livelihood (Redpath et al. 2015). It is thus necessary to distinguish various interests of the conflict, i.e. not only to seek the technical solutions which eliminate the impacts, but also to consider our own role and goals.

The livestock farmers insist that wolves no longer need the degree of protection that is currently applied and that wolves do not belong to the cultivated landscape, and they ask for the establishment of areas where wolves will be protected. Various studies deal with regionalisation, for example, the spatial extrapolation using the model of habitats (Glenz et al. 2001) or modelling the species distribution (Eriksson and Dalerum 2018). Breeders think that serious harm to livestock is attributable to the fact that wolves are losing their shyness since their attempts to attack herds do not end fatally for them. Recommended protective measures are not efficient enough and entail high costs, which sometimes exceed the value of the herd. Wolf attacks make the farm animals suffer, which cannot be justified by anything. Breeders feel that their rights to protection of property and their freedom to conduct business are breached. The goal of their work is not and cannot be the compensation for dead animals.

The Nature Conservation Agency of the Czech Republic considers proposing such measures, which would help the affected breeders finance the security of their herds in a better way. Another option considered is the introduction of another payment either per hectare of grasslands or per livestock unit within AEO, which would take into account the increased costs of breeders in wolf areas. The administrative process of filing requests for subsidies for these measures is also suggested to be simplified. In view of the EU legislation, the culling of wolves is still out of the question. It is, however, possible that the regionalisation of wolf population will be worked on, although not in the near future. The stakeholders will probably wait for progress in the European Parliament and, in particular, the evolution in Germany.

The attitude of independent protectionists is ideological and based on the traditional assumption that a wolf is a beneficial animal and its population and the area where it lives cannot be limited. It is clear that the vision of a favourable state which would initiate the change in the wolf status as a critically endangered species is missing and the problems to be raised in future are not considered. The argument relying on the need for return to wild nature is based on romantic misconceptions about the unspoiled wilderness along with the wise men who were consciously practising the environmentally sustainable lifestyle. Wilderness has always been transformed by humans and therefore these are rather philosophical debates on whether it should be expanded into the densely populated cultivated landscape (Geist 2007). In promoting and ensuring socio-economic acceptability of the wolf population expansion, the negative side effects are not taken into consideration. Apart from a considerable increase in costs, these effects also constitute significant aesthetic and recreational restrictions applied to the landscape. The wolf expansion into the densely populated countryside, moreover, entails the risk of increased hybridisation with dogs and what will happen after the natural prey is depleted and the livestock is not available any more is not considered either.

The unconditional acceptance of a positive environmental and social value which the wolf accounts for is not unambiguously supported in scientific studies (Allen 2017, Mech 2017). There are, of course, primary and secondary effects that the wolves bring to the territories not occupied by them beforehand. These effects, however, do not always have positive impacts on other endangered species. Carnivores may have both direct and indirect positive, negative or neutral impacts on social, economic and environmental values and these impacts may change in time (Chamberlain et al. 2014, Haswell et al. 2017). Highlighting only the benefits and ignoring negative influences have an adverse impact on the credibility of scientific studies on large carnivores, encouraging the growth of an invasive science denialism (Russell and Blackburn 2017).

Although the aesthetic and cultural value of wolves is substantial and contributes to the mitigation of conflicts with humans, controversy about wolves will surely continue. The most useful method of encouraging wolf protection is to preserve their free spreading in the territories with the least risk of conflict with people and their activities (Mech 2017). Approaches to wolf protection will vary according to local situations. It means that the wolves should be fully protected in national parks,

nature reserves and other areas where their contact with people is minimum. On the other hand, in places with a high conflict occurrence, the administration will have to proceed to the zoning process and regionalisation with the application of various levels of protection – some studies have already drawn attention to this fact for many years (Linnell et al. 2005, Boitani et al. 2007, Chapron et al. 2014, Mech 2017). In the case of large carnivore protection, there is no perfect solution – only more or less acceptable compromises (Linnell et al. 2005, Mech 2017).

Environmental activists represent a very strong lobby with giant political and financial support behind it. Not surprisingly, they make their best efforts in order to maintain their influence and financial backing and to pursue their interests which do not always go hand-in-hand with a genuine relationship to the countryside. Nature conservation manifests itself as a new party accumulating speculative capital (Büscher and Fletcher 2015) and, as such, it may have an adverse influence on not only the economic activity of people but also on protected species (Margulies and Karanth 2018). The power of their support and promotion is clearly demonstrated in the public opinion and frequent ostracism of opponents in public discussions. In the case of absolute wolf protection, the opponents are the people who are the most affected by the problem, namely farmers, rural residents and hunters who are essentially dependent on the landscape and its protection. These individuals do not lack the information on the relationship to nature and are often able to render a far broader picture of the policy impacts than the bureaucratic machine can. The inhabitants in wolf areas have a changed lifestyle and concerns over property protection and they are restricted in their well-being, living space and freedom to do business. We therefore believe that their arguments need to be listened to and evaluated impartially and with an open mind, which is often not the case. All that has been suggested so far is, basically, the only solution, i.e. an increase in damages paid and a fostering of protective measures.

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