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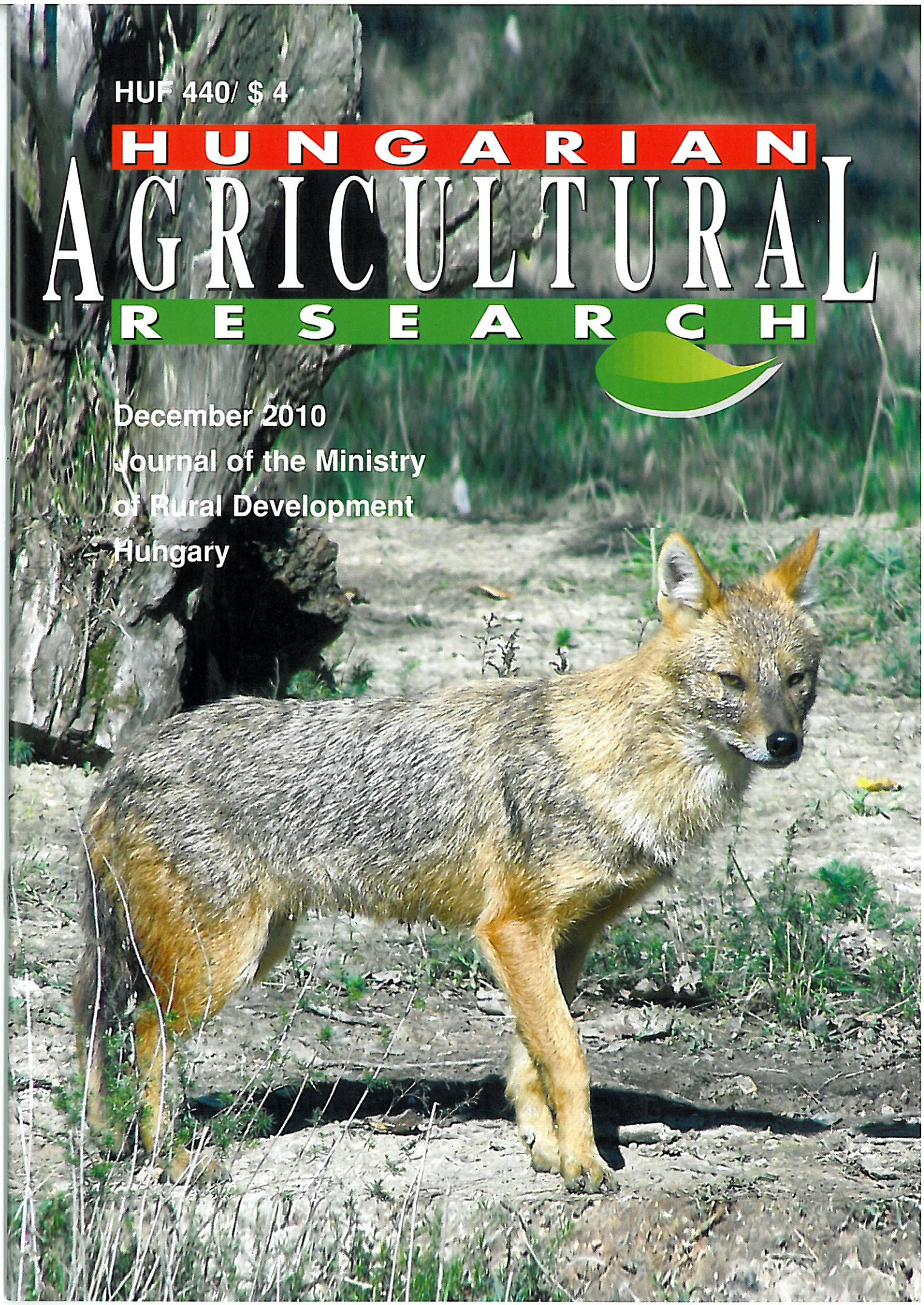

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Jackal Versus Livestock – Is it a Real Problem?

News about the dangers and damages caused by golden jackal are becomign more frequent, they are almost common place nowadays. Most of theese deal with problems in game management and hunting, but the number of injured person in agricultural the sector is also increasing. More and more farmers complain of attack of golden jackal against livestock.

Most of these news talk about, that:

– "Jackal attacks againt livestock started about 6 years ago, and it's getting worse and worse from year to year… "
– "250 sheeps were killed by golden jackal … farmers are terrifying"
– "The golden jackal decimates sheep populations in Somogy county. Some farmers are in dispair. They plan to half their flock."
– "His dogs chase away red fox, but they are afraid of jackals. He thinks that he cannot protect sheep from jackals."
– "Jackals murdered in Somogy county"

It is very exasperating that some of the professional media published the following: "…all that glitters is not gold – "jackal-crime" in Somogy county"

To the contrary one of the latest news reports states that "Not jackals killed sheep at all (It's unimaginable that jackal can cause such destruction was written in news earlier…)".

To finish the stgring of events, an extraordinary news item was published: A lame jackal was received into a flock recently in Baranya county…

In this paper our aim was to produce a real image – in contrast to boulevard news with a lack of any professional knowledge – based on results of the last decade study in Hungary paralell to international issues. We'd like to show the life style of the jackal, focused on it's feeding habit. Finally it's not a hidden intend to help the reader to form an opinion if the complaints were justified about the damage in livestock caused by golden jackal.

Jackals over borders…

Over the last three decades the distribution of the jackal has increased significantly in Europe, particularly in the northern and western territories of the Balkan Peninsula and in Central Europe especially in Hungary. In contrast, jackals in Greece have experienced a large-scale population decline, becoming the rarest canid species in the country. Causes of decline are related to fundamental changes in agro-pastoral activities that taking place in the last 25–30 years in low land Greece, reducing both habitat and food availability. In Israel, jackal population size has been largely dependent on human activity. After a poisoning campaign in 1964 (which resulted in an almost complete extermination of jackals) a quick population recovery was noted, thanks to the rise in human standard of living, increased numbers of open garbage dumps and improper husbandry waste disposal. The Bulgarian jackal population experienced a 33–fold increase in range from the early sixties to mid-eighties. The causes of this rapid expansion among others were reported to planting of scattered coniferous stands which formed very dense impenetrable scrub, the highly increased food base in the form of domestic and game animal carcasses from the state game farms.

…and inside the borders of Hungary

Papers and notes about golden jackal observations and shoots are available in extremely small quantities in Hungary since the first quarter of the XIX century. In reference to these papers it can be declared that golden jackal as a native predator of the Carpathian-base has been occured at all times in a low density and in patches in our country.

It was considered as a scarce predator at the turn of the century, the last known female was shot in the eastern part of Hungary (Derecske) in 1942. There were only 5 official observations and shots in the following decades, but those were young males. As a consequence of no breeding pairs have been known of for

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Picture 1: *Golden Jackal (Photo by József Lanszki)*

approximately 50 years, golden jackal was listed in the Hungarian Red Data Book in 1989 as an extinct species.

The main causes of its disappearance are the high degree land reconstructions, river controls, changing the agricultural production on a drastic level (hugh fields, increased chemicals, braking fallow lands). Due to these changes the suitable habitat of the jackal was decreased and disappeared. Chasing and systematic massacre – using illegal tools and methods – of the predators were also conducive to become extinct.

Observations became frequent mainly in the southern part of Hungary, close to the Serbian and Croatian border in the early '90s. Then breeding pairs appeared in 1994. The golden jackal population has been increasing since then, resettling and spreading show an exponential character (Szabó et al. 2009).

Livestock predation in the world

However, the impact of predation varies dramatically with region. In Africa, Australia, the Americas, and parts of Europe and Asia predators can be a serious problem. In contrast, some nations are virtually devoid of sheep predators. Worldwide, canids—including the domestic dog—are responsible for the majority of sheep deaths. Other animals that occasionally prey on sheep include: felines, bears, birds of prey, ravens, feral dogs and hyenas. Sheep have very little ability to defend themselves, even when compared with other prey species kept as livestock. Even if sheep are not directly bitten or survive an attack, they may die from panic or from injuries sustained.

Jackal predation

The jackal in Europe is distributed in small and scattered populations, mainly along the Mediterranean and Black Sea coast of the Balkan Peninsula (Demeter & Spassov 1993). Most of the jackals were concentrated in the eastern parts of the peninsula mainly in Bulgaria.

Habitat conditions are usually well indicated by the diet composition and feeding habits of predators. The jackal is a typical food generalist carnivore. Its main food source comprises of small mammals, wild ungulates or live stock (young and carrion), and periodically invertebrates, birds and fruit. Depending on food availability, jackals may be solitary hunters, co-operate in pairs or hunt as groups (mainly while the parents teach the offsprings to hunt). Jackal can' t run persistent like the wolf, it is derived from its anatomy (relatively short legs). That is why jackal attack from ambush mainly. On the other hand it is often reported in boulevard news that

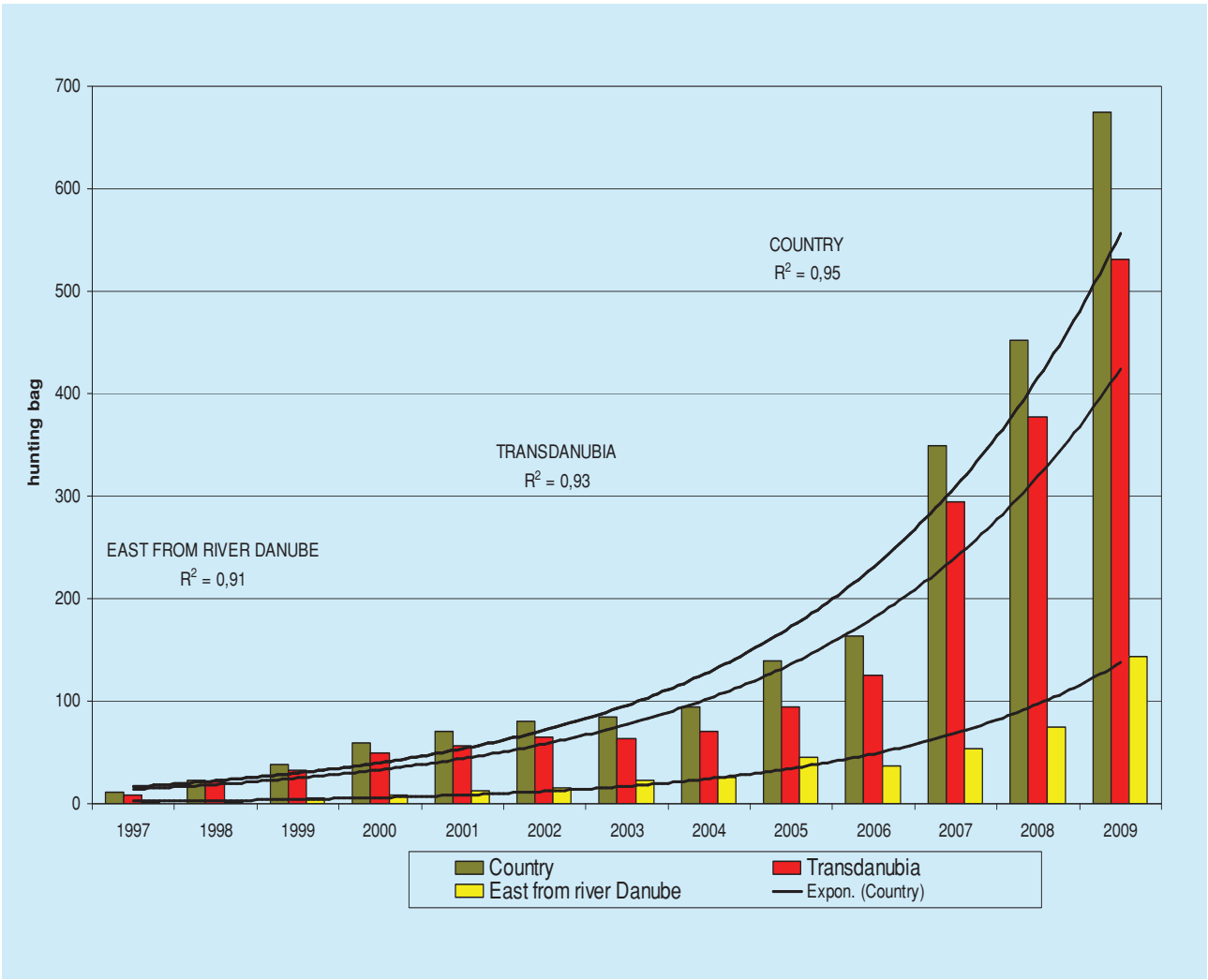

Figure 1: *Changing of the hunting bag in Hungary 1997–2009 (source: Hungarian Game Management Database, Gödöllő)*

jackal can chase its prey at a speed of 40 kilometres an hour.

In **Bulgaria** most of the attacks on livestock happened in the flocks of sheep that grazed unattended at night in 17 pastures. In the southern part of Bulgaria, 1,053 attacks on small stock, mainly sheep and lambs were recorded between 1982-87. In this case the high predation rate is thought to be the consequence of a jackal population explosion due to the availability of food in illegal garbage dumps. Beside this, high level depredation was helped by the lack of preventative measures. However, the highest damages by jackals are minimal when compared to the domestic animal losses by wolves.

Yom-Tov et al. (1995) give an account of cattle predation in the Golan Heights in **Israel**. Approximately 2% of the calves born die due to predation, mainly by Golden Jackals. Three-quarters of attacks occur within 2 days after birth. 31% of deaths occurred during delivery or several hours after it, 32% during the first day after delivery and 12% during the second day. Thirteen percent of calf deaths occurred within 2–10 days and 11% within 11–30 days after delivery. A difference was found between sexes. Male calves are usually more likely to be attacked than females, because they are heavier and more difficult to deliver. Female cattle giving birth are sometimes attacked along with their half born offspring. Mainly the face and tongue of calves are attacked during delivery, while the calf is still partly in the womb. In spite of that death is principally caused by opening the posterior part of it's abdomen after delivery. In some cases the mother's vaginal area is also damaged and several cows had to be destroyed because of serious injuries.

In the Golan Heighs serious predation level was found against cattles. In all probability this situation could have developed because of almost unlimited food resources for jackals. There are only two official garbage dumps, but more than 70 illegal dumps were found. In several cases there were two or three dumps near one settlement. These dumps contain

Picture 2: *Golden Jackal (Photo by József Lanszki)*

domestic refuse, construction and packing materials, but also agricultural waste including fruit and vegetable surplus and dead turkeys, hens, calves and cows. It is likely to helped the jackal population increasing in this territory.

On the other hand the cattle grazed unattended all year round in paddocks and gave birth in the field, so the opportunistic jackals would learn to exploit newborn calves.

Giannatos et al. (2005) reported that the only area in **Greece** is Peloponnese where predation by jackals on small livestock occurred. Damages happened in those areas where the jackal population occurred in marginal mountainous habitat and the sheep and goats grazed unattended at night. Stray dogs and jackals are the only predators that could prey on small hoofed livestock, since wolves have been eradicated. So all the prevention measures are missing. Nonetheless, according to local shepherds only a very little damage was recorded and does occur is caused mostly by isolated roaming individuals.

On the contrary, in areas with high jackal densities (Mornos, Northern Greece, Samos) the preventive methods used at night (keeping of sheep and goats in enclosures, using guarding dogs). Jackal groups or individuals have been radio tracked or seen often close to sheep pens, around cattle and nearby chicken pens at night, but no complaints for losses by the farmers.

Strength of negligible damages the predation on livestock by jackals is sooner local a minimal in Greece.

Feeding habits of the golden jackal

Beside the observations, shepherd's report and questionnaire

surveys it is very important to study the feeding habit of the jackal by scientific methods. In the next part a few researches will be shown in different countries and periods. The procedure was the same: scat analysis was used to get to know the diet of this carnivore.

1. "Domestic problems" in three countries-three habitat types

First, feeding habits were compared in Hungary (temperate climate agricultural area), Greece (Mediterranean marshland), and Israel (Mediterranean agricultural area). Samples (84, 70 and 64 scats, respectively) were collected late autumn. Large differences were detected in the consumption of domestic animals between the three study areas. According to biomass, the highest rates were recorded in Israel (74.0%), slightly lower in Greece (62.6%) and substantially lower levels in Hungary (1.4%). In Israel, domestic animal food type was dominated by poultry followed by eggs, cow and cat. In Greece jackals consumed mostly goats, sheep, poultry, dogs (2.9%) and cats. Cat and poultry consumption was also detected in the Hungarian samples.

According to the studies by Yom-Tov et al. (1995), domestic animals along with small mammals were the most important dietary components of jackals in Israel. Small mammals were found to be a main food source also in Kazakhstan, Azerbaijan and Uzbekistan, India, Bangladesh (Jaeger et al. 2007) as well as in Tanzania close to the equator. In the studied area of Greece with extensive grazing and Israel with a high density of poultry farming, the primary foods of jackals were human related animals, mainly goat and poultry (respectively). While jackals are able to hunt the young of domestic ungulates especially during their birth season (Stenin et al. 1983, Yom-Tov et al. 1995) or poultry, direct predation by jackals on goat (grazing stocks) and poultry was minimal in the study areas in Greece and Israel. The consumption of domestic animals (excluding domestic dog and domestic cat) cannot be at tributed to seasonal predation, but rather to carcasses left in the field (Greece) and around poultry farms (Israel) which are consequently cleared up by the scavenging jackals (Macdonald 1979). Presently, grazing and carcass dumping is uncharacteristic in the Hungarian study area. The results of low domestic animal consumption in Hungary and high in the two Mediterranean areas are in accordance with results from earlier studies carried out in the regions (Macdonald 1979, Lanszki et al. 2006).

Variability in plant consumption was detected between the regions. Although jackals ate plants most frequently in Israel (olive, grape and sunflower: 41.5%), second most in Greece (blackthorn and maize mainly: 39.0%) and the least in Hungary (mainly Blackthorn: 28.7%).

2. Diet composition of golden jackals during cub-rearing season in Greek marshland

Ninety-five scat samples were collected in Greece between November–December 2006. According to a biomass calculation closer to the quantitative composition of the consumed food, the most important food for the jackals was made up of two equally important taxa. One of them is domestic animals (35.8%, biomass calculation), and the other is birds (35.6%). The dominance of these two food taxa was not typical in other studies, especially in the cub raising period. Only in Israel (Yom-Tov et al. 1995) and in Bulgaria the consumption of domestic animals and domestic animal remains considerable. In Greece, the most important were the goats among the domestic animals, and medium-sized birds (probably mostly waterfowl, Anseriformes) among the birds. Consumption of juvenile goat was provable at least one case (by consumed and defecated cloven hoof), but the circumstances of this event were unknown (no decomposing insect remains were found in the scat sample). Considerable consumption of birds was only experienced in Azerbaijan. Jackals are not persecuted in the study area, and it is considered an indifferent species by the local farmers; since the jackal direct predation on livestock is minimal in the area, so the consumption of domestic animals cannot be attributed to predation, but to carcasses left in the feld.

In conclusion, jackals living in Mediterranean sandy seashore moorlands in Greece, feed their cubs with a diverse diet, supporting their opportunist feeding habits. In contrast with most Eurasian and African studies (review: Demeter and Spassov 1993), the consumption of domestic ungulate corpses and waterfowl was important, and the consumption of smaller (less than 100g) prey and plants were frequent, but less important in the cub raising period.

3. Results in Hungary between 2001 and 2004

Despite others, unique result were noted in a hungarian study in Baranya county after analysing 814 collected scats.

Small mammals were generally the most important food of golden jackal (seasonal mean 70–90% of confused biomass) ranging bet-

Picture 3: *Golden Jackal (Photo by Andrea Lippai)*

ween 37% and 97% in the scat samples. The main prey was the common vole (Microtus arvalis). Wild ungulates (0–43%) especially wild boar (mainly piglets in the spring) was the second most important food, whereas there was a low presence of cervids in the scat samples of the jackal. Domestic animals (mainly cattle and pig carcasses, rarely domestic cats) were eaten occasionally and generally in small amounts (0–29%). In contrast to experiences in the Balkans and the Middle East (Demeter and Spassov 1993; Yom-Tov *et al*., 1995) with the exception of occasional sheep grazing, no depredation on livestock was recorded in this study. Because sheep were housed at night in a nearby village and animal husbandry was not extensive, only the scavenging from a dump was confirmed (Lanszki et al 2006).

Is there a solution – defending methods and possibilities

Sheep producers have used a wide variety of measures to try to combat predation throughout history. In the past shepherds had only the most basic of tools: their own presence, livestock guardian dogs. Beside these they used protective structures, fencing and barns. Fencing (both mechanic and electric), penning sheep at night and lambing indoors all continue to be widely–used methods of protection today. Whereas sheepdogs herd sheep, guardian dogs are trained to integrate in to flocks and protect them from predators.

Donkeys and guard llamas have been used since the 1980s in sheep operations, using the same basic principle as guardian dogs. Horses and cattles also help to deter predators, even if such species do not actively guard sheep. Moreover the focus in dealing with predators shifted to the nearly exclusive use of guns, traps, and poisons to kill predators.

During acoustic survey (in Greece and in Hungary) scientists found that dogs become very agressive when a jackal howling is heard. They noted many times that dog groups approched the vocalization point while they were barking provocative after the playback. The reaction of unleaded dogs in close quarters with jackals was to chase them away instantly.

It is important to mention that several international study prove that guardian dogs not just chase away jackals from the farm, but they killed them sometimes.

But the especial importance is to choose the most suitable type of dog. Its not enough to use a small

drive-dog, because bigger guardian dogs (e.g. hungarian types: kuvasz, komondor) are able to fight against predators. Sometimes farmers say that their dogs are afraid of jackals. It is very hard to believe, if we compare the body weight of golden jackal (10–15kgs) to kuvasz or komondor (40–60 kgs). On the other hand sepherds use these dogs for centuries successfully against wolf and brown bear.

Most of the hunters recognize the golden jackal in all probability in Hungary nowadays. But we think that it is very difficult to state unambiguously whether a jackal or a dog killed the prey. It's probable that it is such a serious problem in case of animal husbandry. Not all the farmers know the different kind of attacks. The most typical method of the attack is a bite to the throat and choke. So, sometimes it can be possible to identify (or to rule out) the predator species strenght of the injury, the distance of the eye-teeth. The two teeth are 25–30 mms apart, so in case of 35–45 mm it is sure that the agressor wasn't a jackal – as it happened rarely.

It is well-known that stray dogs could be extremely dangerous on game species and livestock. On the basis of the Hungarian Game Management Database 47,000 stray dogs were brought down on average annually between 1969 and 2003. There was a constitutional court decision (64/2003. (XII. 18.)) in 2004 which increased the severity of stray dog hunting. Thanks to this decision the hunting of dogs decreased ~70% in the next five years (2009: 11467 individual). It is probable that it does not mean the number of stay dogs has decreased to by a third, but there are three times more dogs living in the hunting territories than shot in a year on average. So it is possible that dogs are responsible for the attacks instead of jackals in several cases. During the above mentioned survey in Israel researchers tried to identify the predator which caused the death of calves. In this study (for 64 calves) at least 70% of the attacks were carried out by jackals and the rest by either feral dogs (20%) or wolves (10%). In few cases stray dogs were causing damage to small stock animals, which were attributed to jackals.

We have to mention the problem of increasing poaching. It is difficult to do a well-planned game management in this case, so its easy to find a scapegoat, which has become the golden jackal several times.

In conclusion, we found the diet of the jackal to be diverse and feeding habits to be extremely flexible. These patterns varied between study locations and seemed to be driven by opportunistic feeding habits targeting the most easily accessible food source. In more human influenced land scapes of Mediterranean Greece, comprising of partly natural and partly cultivated (pastured) areas, jackal dietary composition was dominated by domestic ungulate carcasses originating from open dumps and wild boar from the marshland and thickets. Jackals residing in the human-dominated landscapes of Israel were found to take full advantage of available resources, specifically the dominant presence of poultry carcasses and plants from agricultural plots, and were able to thrive and maintain an extremely dense population. This is in accordance with other studies that demonstrate that the species could flourish where human waste is abundant and food is no longer a limiting resource (Yom-Tov et al.1995).

So, it is clear, that by using the defending methods (among others: fence, dogs, checking, night penning… etc.) the damage caused by predators on livestock could be decreasing successfully.

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