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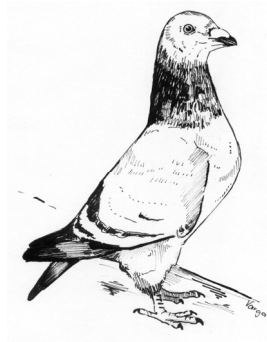
**The presence of pigeons (Columbiformes) at animal breeding
farms**

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1. Introduction, objectives

Our animal breeding farms – according to the technological devices – attract numerous mammal and birds species due to the continuous food resources. The presence of these species is not significant in all cases (e.g. fox, rat, small predators), however in case of some bird species the number of individuals could be that high that effects the production activity because of different reasons.

At most of our animal breeding farms – mostly where the feeding of animals happens outside –we can count with the appearance of these bird species. It is a generally accepted fact that these birds could cause even significant economic losses by their presence. Although there are no overall examinations on the forage consumption and illness spreading role of these bird species yet.

Feral pigeons (*Columba livia f. domestica*) and Collared Doves (*Streptopelia decaocto*) visit animal breeding farms in mass from the five pigeon species that native in Hungary. It is important to know their life styles, behaviour and to have information on the measure of their real food consumption to prevent the potential economic losses and animal health problems.

The presence of pigeons brooding in our towns in a large number, raise well known human health care problems, thus the consideration of their attendance is often negative.

Collared Doves have been spreading significantly from Asia to Europe only in the last 60 years, and became widely prevalent throughout Hungary in the last decades. As the Collared Doves quite more distrustful than feral pigeons and during hatching – from spring until autumn – the pairs own a certain territory, we can observe their bigger groups at the already mentioned farms only at wintertime. Their presence nearby granaries, at outdoor poultry production farms and cattle breeding farms can be declared multitudinous.

According to the general opinion pigeons adapted well to the urbanization effects could cause numerous problems, from which the one most important is their illness spreading role. Researches so far proved that pigeons living in towns could carry 60 different pathogenic organisms harmful for humans, from which they could even convey some to humans (Haag-Wackernagel and MOCH, 2003).

However it is only assumed that pigeon populations of animal breeding farms far from towns could infect the animal stock of these farms with similar organisms.

My goals were:

- Gender definition of Collared Doves with biometric methods.
- Feed biological examination of feral pigeons and Collared Doves feeding at animal breeding farms.
- Comparison of food composition of Collared Doves feeding at animal breeding farms and of those Collared Doves that are feeding far from the farms.
- Determination of the economic loss caused by the two pigeon species due to their feeding at the farms.
- Animal health examination of the two species, determination of possibly negative animal health effects of the birds on the animal stock of the farms.

2. Materials and methods

2.1. Collecting the samples

In case of Collared Doves the collection of the samples was carried out weekly at the Debrecen-Kismacs farm. Besides, we were collecting samples from the Collard Dove populations feeding at agricultural areas near to Szeged in every second month. I stored the killed individuals deep-frozen at – 20 °C until the beginning of the pathological examinations.

In case of feral pigeons samplings happened monthly at the animal breeding farms. The number of samples collected for one occasion was between 1 and 10 according to the weather conditions, number of pigeons and human factors. I stored the killed individuals deep-frozen until the beginning of the pathological examinations.

2.2. Pathological and biometric examinations

Before the pathological examinations the following biometric data was collected from the defrosted carcasses:

- body weight,
- body length,
- wing length,
- tail length,
- beak length,
- tarsus length,
- length of the third scapular feather.

I measured and determined the weight and the number of seeds from the food remains removed from the crop of the dissected birds in an air-dry status. I applied for the measurements a Pesola 300 g calibrated spring scale.

2.3. Pathological examinations

After removing the components of the crop, the pathological examination of the carcasses was carried out in the Veterinary Institute of Debrecen according to the following:

- Histology examination of tissues (lung, trachea, brains, liver, heart, kidney) collected individually

- Proving of poultry pest (individual virology examination)
- Individual parasitology examination of faeces
- Salmonella examination with pool technique (liver, spleen, intestines)
- Bacteriology examinations

2.4. Living animal experiments

The determination of the daily fodder consumption of the two pigeon species was carried out with captured individuals (3-3 pair per each species), kept in pairs in 2m high, 3m long and 1 m wide aviary, that were partly covered. In the stilted feeders unitary weight (in case of Collared Doves 50 g, in case of feral pigeons 100g) maize grain was distributed every morning, what I measured back on the following morning.

2.5. The periods of examinations, analysis methods

Object of examination	Year of examination
Sample collection from the Debrecen-Kismacs turkey farm	2004, 2005
Sample collection from the two cattle breeding farms	2005, 2006, 2007
Animal health and feeding examinations	2005, 2006, 2007
Living animal experiments	2007

In the statistical analysis I used Kolmogorov-Smirnov test, χ^2 -probe, independent samples t-probe.

2.6. The sample area

1. Agrárgazdaság Ltd. Cattle breeding farm, Debrecen
The farm specialized for milk production is located 3 km North from Debrecen, at the right side of the road number 35, on the way to Debrecen-Józsa. At the cattle farm of Debrecen, production is going on with a Hungarian milking species. The number of pigeons staying continuously at the farm is approximately 1000 individuals.
2. Bátortrade Ltd. Cattle breeding farm, Nyírbátor

The farm is located only half km far from Nyírbátor. At the farm, which is specialized for milk, production Holstein Friesian stock is used.

The number of pigeons that could be observed at the farm continuously fluctuated between 100-200 individuals.

3. University of Debrecen Centre of Agricultural Sciences, Debrecen-Kisacs

The farm is located 3 km far from Debrecen, at the right side of the road number 35, on the way to Debrecen-Józsa. In the experimental farm the preservation and breeding of gene reserve stock of Bronze and Copper Turkey and Frizzled Hungarian Goose is going on.

The number of Collared Doves that could be observed at the farm continuously is between 20-50 individuals.

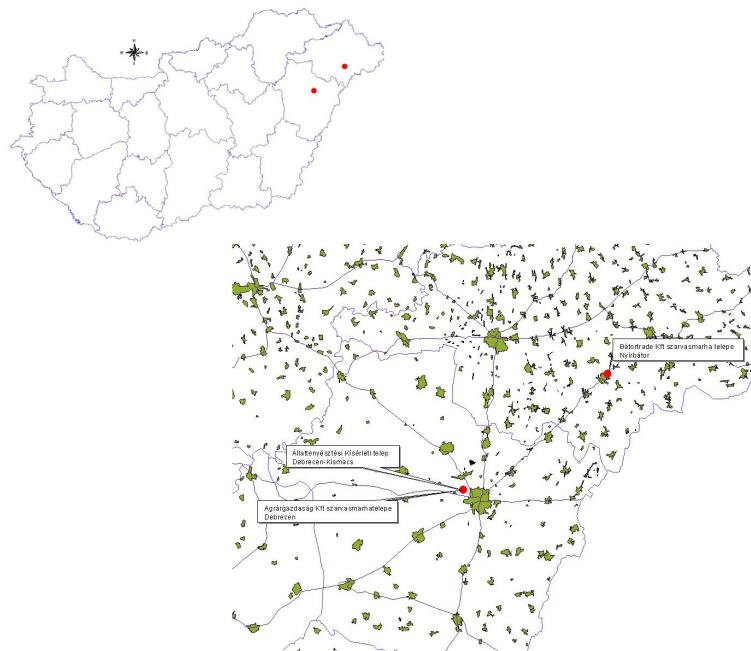


Figure 1. The locality of the sample areas

3. Results

3.1. Results of gender determination of Collared Doves with biometrical methods

Table1.: Biometric data of male and female Collared Doves

	Sex	N	Mean	SD	Std. error of mean
Weight of bird (g)	male	44	203,04	27,79	5,92
	female	36	197,77	13,91	3,28
Bodylength (mm)*	male	44	304,22	10,87	2,31
	female	36	296,11	12,27	2,89
Tail length (mm)*	male	40	136,50	7,52	1,68
	female	36	126,94	6,31	1,48
Bill length (mm)	male	34	14,57	1,92	0,46
	female	32	14,46	1,80	0,45
Leglength (mm)	male	42	55,59	1,63	0,35
	female	36	54,61	1,93	0,45
Tarsus length (mm)	male	42	24,71	1,04	0,22
	female	36	24,19	1,56	0,36
Length of the third quill-feather (mm)*	male	36	136,44	4,55	1,07
	female	32	132,21	4,29	1,07
Wing length (mm)*	male	44	181,00	4,39	0,93
	female	36	175,77	5,36	1,26

The biometrical data of birds whose gender were certainly defined throughout pathological examinations are shown in Table 2. According to the average values, the beak, leg and tarsus length values are almost the same in case of the two genders. However the body weight shows differences in this manner, I could not prove significant disparity (Two-sample t-test, $t=0.731$, $p=0.469$). Although the body and tail length, the length of the third scapular feather and the wing length showed significant difference among males and females (marked with * in the table, body length: $t=2.217$, $p<0.05$, tail length: $t=4.216$, $p<0.01$, length of the third scapular feather: $t=2.774$, $p<0.05$, wing length: $t=3.386$, $p<0.05$). I stated by the 80 individuals that I examined that the tail length of male Collared Doves is between 115 and 130 mm, while this value is between 130 and 150 mm in case of males. From the examined 80 individuals in case of 70 (87.5 %) this method was applicable. As the half of the rest 10 individuals that showed transitional values was juvenile, it can be stated that this method could be applied successfully only in case of adult birds.

3.2. The results of the feeding biological examinations

3.2.1. Results of the feeding biological examinations of Collared Doves

By the nutrients found in the craw of Collared Doves collected from the Debrecen-Kismacs farm, it can be stated that the most important food of Collared Doves feeding at this farm is the maize that is distributed to turkeys and geese (Table 2.).

The Collared Doves feeding at the farms were consuming the fodder of poultries during the whole year; only the late summer and autumn months were exceptions, as from August until October the doves are feeding at the ripening sunflower fields. The biggest proportion of sunflower seeds found in the craw of the dissected birds (occurrence ratio of sunflower seeds: 11.7 %) were detected in these months.

According to the nutrients found in the craw of Collared Doves collected from the farm-stead area near to Szeged, it can be stated that the most important food of these doves are also maize and wheat from courtyards (occurrence ratio of these seeds among the craw contents is 70.5 % and 23.5 %). In the autumn months – similarly to

the doves feeding at animal breeding farms – the food of these doves was mainly sunflower also (occurrence ratio of sunflower seeds among the craw contents is 12.9 %).

It is clear furthermore that the food composition of the doves feeding continuously at animal breeding farms differs slightly from the birds' feeding at courtyards and agricultural areas (Figure 2.). This shows that the Collared Doves living and nesting far from the towns and farms in a village-farm-stead environment, are also seek for the closeness of humans and their food base is composed of fodder crops cultivated for human or livestock consumption. This statement is also supported by the χ^2 test, according to which there is no significant difference between the food consumption of Collared Doves feeding at the Debrecen-Kismacs farm and of those that are feeding at agricultural areas around Szeged ($\chi^2=7.483$ df=5, p=0.187). Thus, due to the data of craw components, the similarity in the food composition of the two dove populations living in different habitats can be proved statistically also. Considering all what have been mentioned, we can state that Collared Doves endeavour to utilize in a great extent the anthropogenic factors beneficial for them, bettering their own surviving and reproduction success.

Table 2.

Weeds found in the craw of killed Collared doves, the number of cases when the different weed species were detected in the craw content and the proportion of the mentioned cases

A) Craw content data of individuals collected from animal breeding farm

B) Craw content data of individuals collected from agricultural area

Food	A (n=51)		B (n=85)	
	Case	%	Case	%
Sunflower (<i>Helianthus annuus</i>)	6	11,7	11	12,9
Wheat (<i>Triticum aestivum</i>)	4	7,8	20	23,5
Maize (<i>Zea mays</i>)	44	86,3	60	70,5
Barley (<i>Hordeum vulgare</i>)	2	3,9	2	2,3
Hemp (<i>Cannabis sativa</i>)	-	-	2	2,3
Redroot pigweed (<i>Amaranthus retroflexus</i>)	-	-	1	1,2
Barnyardgrass (<i>Echinochloa crus-galli</i>)	1	1,9	1	1,2
Shore orache (<i>Atriplex litoralis</i>)	1	1,9	-	-
Common chickweed (<i>Stellaria media</i>)	2	3,9	2	2,3

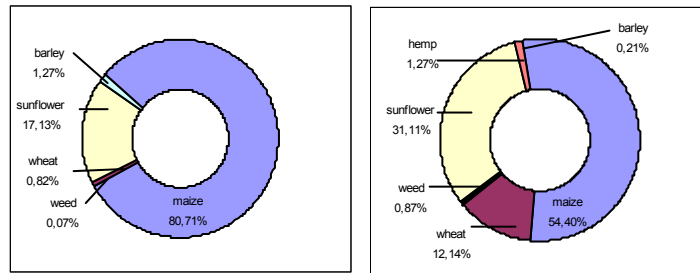


Figure 2. Mass percent proportion of seeds found in the craw of Collared doves collected from the Debreceen-Kismacs farm (n=51) and from agricultural areas near Szeged (n=85)

3.2.2. Results of the feeding biological examinations of feral pigeons

However feral pigeon is one of the most wide spread bird species in Europe, and it occurs in towns and villages in a large number, only a few articles deal with its feeding biology, both on a national and both on an international level.

I presented the craw component data of feral pigeon populations of the two examined cattle farms in Table 3. In column "A" I present the results of the researches of MURTON and WESTWOOD (1966), to compare these data with my results. In their research the authors examined the feeding habits of a city population in England.

The pigeons consumed mainly maize, wheat and rye at both animal breeding farms, while they also ate a smaller quantity of sunflower and oats at the Nyírbátor farm. We can see the absolute priority of maize in case of the Nyírbátor farm, where the food of the birds composed mainly of the forage mixture mixed to the silage and to the rough fodder (64.2 %). The food of feral pigeons feeding at the Debreceen farm is composed mainly of maize also (85.7 %), while wheat could be detected from their craw contents in a smaller portion (28.6 %). During the craw content examinations, I created different categories for the broken and whole maize kernels, thus it was possible to distinguish between the semolina mixed into the forage,

the broken and whole seeds in the maize silage and the crumbled seeds of another origin

Table 3.

Weeds, crops and other foods found in the craw of feral pigeons collected from the Debrecen farm of Agrárgazdaság Ltd. (B) and from the Nyirbátor farm of Bátortrade Ltd. (C) and according to the data of MURTON and WESTWOOD (A), the number of cases when the different foods were detected in the craw content and the proportion of the mentioned cases

Food	A (n=250)		B (n=70)		C (n=81)	
	Case	%	Case	%	Case	%
Sunflower (<i>Helianthus annuus</i>)	-	-	-	-	6	7,4
Wheat (<i>Triticum aestivum</i>)	45	18,0	20	28,6	4	4,9
Barley (<i>Hordeum vulgare</i>)	47	18,8	-	-	-	-
Maize (<i>Zea mays</i>)	23	9,2	60	85,7	52	64,2
Rye (<i>Secale cereale</i>)	-	-	2	2,8	20	24,7
Oats (<i>Avena sativa</i>)	-	-	-	-	8	9,9
Pea (<i>Pisum sativum</i>)	15	6,0	8	11,4	-	-
Apple (<i>Malus domestica</i>)	-	-	-	-	2	2,4
Millet (<i>Panicum miliaceum</i>)	-	-	8	11,4	-	-
<i>Rumex sp.</i>	-	-	-	-	3	3,7
Wild millet (<i>Panicum miliaceum subsp. rudelare</i>)	-	-	4	5,7	-	-
<i>Galium sp.</i>	14	5,6	-	-	-	-
<i>Brassica sp.</i>	5	2,0	-	-	-	-
<i>Stellaria sp.</i>	4	1,6	-	-	-	-
<i>Chenopodium sp.</i>	3	1,2	-	-	-	-
<i>Polygonum sp.</i>	3	1,2	-	-	-	-
Bread, other baker's ware	197	78,8	-	-	-	-

On Figure 3., comparing the mass percent portions of the craw contents of the pigeons collected from the two farms, the differences in the food consumption of the two populations could be observed. The pigeons feeding at the Debrecen farm collected the half of their food not from the farm (whole maize kernel, 54.87 %), while the primary food for the pigeons feeding at the Nyirbátor farm are the forage of cattle (broken maize, 81.35 %).

By evaluating the data with χ^2 test also, it can be stated that the food of the feral pigeons feeding at the Debrecen farm differs significantly

from the food of the pigeons feeding at the Nyírbátor farm ($\chi^2=89.657$, $df=8$, $p<0.01$).

By the results of the feeding biological examinations, it can be stated that we did not find wastes and garbage that could be collected from the towns among the foods of the birds. However, the food consumption of the birds feeding at the two animal farms is different also. The birds of the Debrecen population collect the biggest proportion of their food from near-by seed factories and courtyards, while the Nyírbátor birds feeding almost totally from the animal breeding farms. The most important reason of the different food proportion of the two populations could be the different number of birds as the population of the Debrecen farm of approximately 1000 individuals requires too much food to collect that easily and quickly in its total volume only from one farm.

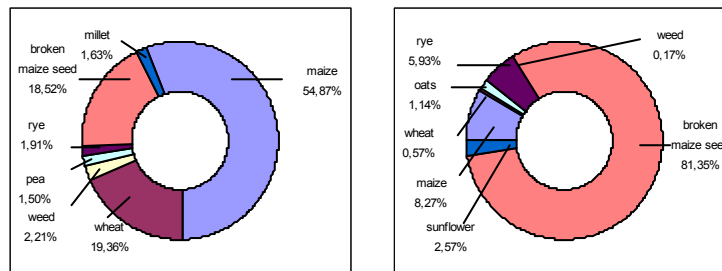


Figure 3.
Mass percent proportion of seeds found in the crop of feral pigeons collected from the Debrecen (n=70) and Nyírbátor farms (n=81)

3.3. Results of the animal health examinations

At the beginning of the series of examinations, one of my primary objectives was to survey the animal health status of pigeons and doves feeding at animal breeding farms and to state whether these birds have a role in spreading different illnesses, pathogens. In general, every author accepts the role of wild birds in the developments of epidemics, however the survey and monitoring of the mentioned species in this manner was not carried out so far.

3.3.1. The results of the animal health examinations of Collared Dove

Overall animal health examinations concerning Collared Doves are not known either, ROMVÁRY and TANYI (1977), and GÁL et al. (2002) made virology, pathology and parasitology examinations on this species, but only once and with only a few individuals. During our bacteriology examinations that were accomplished also with low sample size (n=31), *E. coli* was detected from the liver of four individuals, *Enterococcus faecalis* from one individual and cultured *Streptococcus* bacteria from the liver of two individuals. The presence of these pathogens do not allow us to conclude extensive conclusions, however as all three bacteria are facultative pathogen and saprophyte and their presence among natural conditions is normal, Collared Doves could not have a role in the development of illnesses caused by them. We did not find *Salmonella* bacteria in the samples took from individuals of the Collared Dove population that regularly appeared for feeding at the farm in the period of the examination.

3.3.2. The results of the animal health examinations of feral pigeon

From the 205 feral pigeons that were collected from the two cattle breeding farms the animal health-laboratory examination of 103 individuals was accomplished.

The laboratory examinations detected *Salmonella* bacteria from 6 individuals of the Nyírbátor population, while we did not find individuals from the at least five times bigger Debrecen population that were infected by *Salmonella*. Evaluating the gathered data by χ^2 test, there is a significant difference between the *Salmonella* infection of the pigeon populations of the two farms ($\chi^2 = 5.347$, $df=1$, $p < 0.05$).

PASECKI found *Salmonella* in 11 % of the 237 urban pigeons during his microbiological examinations (PASECKI, 2006), this ratio was only 5.87 % among all feral pigeons involved in our examination, while it was 10.71 % in case of the Nyírbátor population, which is similar to the results of the mentioned author.

The significant difference between the two populations could be in connection with the dissimilar life style of the Nyírbátor population, as these birds nest in crowded attics that are contaminated with faeces. During our bacteriology survey we did not find statistical differences between other bacterial infections of the birds from the two farms.

Coccidia are the most common parasites in closed pigeon populations and of wild pigeon beehives also that could cause illnesses as well. The opinions about the coccidium infection of pigeon populations are divided; PASECKI detected 64.1 % infection during his own examinations, from which our results slightly lag behind, as only 15.5 % of the pigeon populations of the two cattle farms were infected by coccidium.

During the faeces examinations, *Eimeria* oocysts were detected in a token amount from the rejections of 16 individuals (Debrecen: 10, Nyírbátor: 6 individuals) from the examined 103 pigeons.

The body of most pigeons creates an equilibratory condition and an immunity could be developed due to the own defence mechanism of the body. This could justify that the body weights of those pigeons from which we detected oocysts were not dissimilar from the body weight average of the populations ($t=1.84$, $p=0.069$); that enteritis developed only in 18,7 % of the birds (due to the degradation of the tunica mucosa caused by coccidia), and that *E. coli* bacteria - got into the blood-stream because of intestine affection - was detected only in 12.5 %.

The probably most antinomic results of the research are the negative results of parasitology examination in case of both bird species. The feral pigeons collected from the two cattle breeding farms, and the Collared Doves collected from the turkey farm except one individual were free from nematode, ascarides and cestoid. We did not find any gape in any feral pigeons, whereas PASECKI showed 30.4 % *Ascaridia*, 48.1 % *Capillaris* and 24.9 % *Raillietina* infection in case of urban pigeons (PASECKI 2006). There are no data on the parasite infection of European Collared Doves; however researchers reported 73 % *Ascaridia* infection by examinations carried out in Florida (BEAN et al. 2005).

By summarizing the results of the animal health examinations, it can be stated that the pigeons and doves feeding at animal breeding farms are not an indirect endangering factor for

livestock from an animal health point of view. Nevertheless the presence of these birds is undesirable at farms, as if they are not occur at the farms we could decrease the hazard of diseases caused by Salmonella also. During the examinations, there were no illnesses incidental to significant perish what could be deduced even indirectly to the presence of pigeons and doves.

3.4. Results of the living animal experiments

By the average data of 9 months of living animal experiments (Figure 4) it was concluded that a Collared Dove consumes 14.92 g cereal seeds daily in a yearly average. According to these data the conclusion of STERBETZ (1980) could seem enhanced, who examined the food consumption of Collared Doves feeding at burned stubbles and determined the daily food amount in 40 g cereal seed.

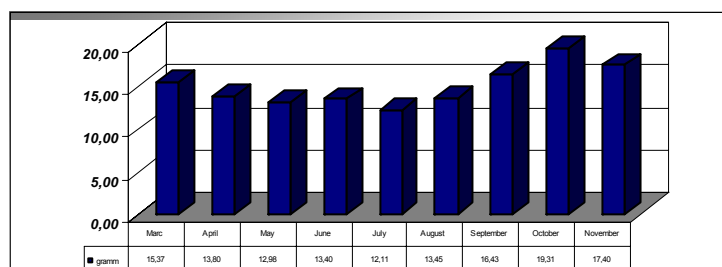


Figure 4.
Average daily food consumption of one Collared dove in the certain months calculated from the data of six Collared doves collected during the feeding experiment

GÁL et al. (2002) support our results, who determined this value in 16 g per one day. By the data of the craw content examinations and the feeding experiment it can be stated that the yearly fodder consumption – with taking into consideration the continuously observed at least 30 individuals – is 103 kg (thus one individual consumes only 3.43 kg fodder at the farm per year). The economic loss that is caused by the birds (approximately 2586 HUF)

is virtually negligible. In case we presume that the birds are not moving far from the farm in the autumn period either and take their food from the farm throughout the whole year, and if we admit that in case of a bigger farm we can count with the appearance of 100 individuals per one day, we can fix their consumption in 544 kg ($0.01492 \times 365 \times 100$) cereal seed. Considering the cereal seed rate of the certain year its price could change between 14000 and 26000 HUF.

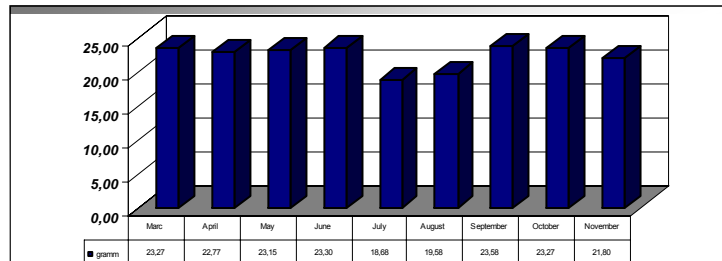


Figure 5.
Average daily food consumption of one feral pigeon in the certain months calculated from the data of six Collared doves collected during the feeding experiment

I determined the daily food consumption of a feral pigeon by the average data of 9 months (Figure 5) in 22.15 g, however MURTON et al. (1972) reported 30 g seeds daily. DUBLECZ and VINCZE (2001) count with an even higher value, with 35 g, however they examined domesticated pigeons kept for flash production.

It could be stated by the data of the craw content examinations of feral pigeons of the Nyírbátor cattle breeding farm that the birds take their food almost all year round from the fodder mixture given to cattle. The amount of the fodder consumed by birds is 769 kg, by counting with a minimal population (approx. 100 individuals). The cost of this is 19460 HUF, what is still negligible considering the yearly expenses of the farm. The examinations at the Debrecen farm proved that the pigeons do not take their whole food from the farm; however their population is much bigger than the birds feeding at the Nyírbátor farm. The yearly fodder consumption by calculating with

the minimal population (some 400 individuals) was 1294 kg at this farm. In this case the economic loss (circ. 33366 HUF) decreased as the birds moved to nearby farms and factories also to get their food. Although, if we presume that some bigger animal breeding farms attract pigeons in an amount that the birds consume only the fodder given to livestock, the cost would be serious for the farmer as well (in a case like this the consumption of 500 pigeons could exceed the 4000 kg, and the cost could change between 100000 and 190000 HUF).

By our examinations it can be stated that the negative effects of the presence of Collared Doves and feral pigeons at animal breeding farms is magnified in most cases, however it is true that their lodging in a mass is not desired at all. To be able to understand the reasons of the cumulating bird population at animal breeding farms and to decide whether there is a need for keeping the birds away from the farms, and what are the possible and economical methods of prevention, it is necessary to involve more animal breeding farms into the examinations.

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5. New scientific results

- 1) According to our examinations, distinguishing the genders in case of living Collared Doves that do not show genital dimorphism is possible only by the length of tail feathers. The applied method is 87.5 % precise, and could be used only in case of adult birds.
- 2) The food of Collared Doves that are feeding at animal breeding farms is the fodder given to livestock all year around, except the autumn months. By our examinations it can be stated that the food composition of Collared Doves feeding at animal breeding farms throughout the whole year do not differ significantly from those birds' that are feeding in agricultural fields. We proved that there is no difference in the food composition of the two dove populations living in dissimilar habitats. By this we can conclude that Collared Dove endeavours to exploit the anthropogenic effects favourable for it in every habitats, bettering its own surviving and reproduction success.
- 3) As we did not detect Salmonella bacteria, endoparasites, other infective agents from the urbanizing Collared Doves that are feeding at animal breeding farms, we can conclude that they slightly endanger animal breeding farms in an animal health point of view in pandemic-free periods.
- 4) Feral pigeons consume the fodder given to livestock, if possible all year round. In case of the Nyírbátor population that nest and spend the nights in the town, was no food detected that could be found only in the town either.
- 5) The Salmonella infection of the urban pigeons and of those that brood at the animal breeding farm is significantly different even statistically. While we did not find Salmonella bacteria in the Debrecen population brooding at the farm, 10.71 % of the Nyírbátor population – that is

exposed more to anthropogenic effects - was infected by Salmonella.

- 6) Except Salmonellosis there is no significant difference between the Debrecen population that is brooding at animal breeding farms, and the Nyírbátor population that nests in panel buildings considering their health status.
- 7) We concluded by the living animal experiments that a Collared Dove consumes averagely 14.92 g cereal seed daily per one year, while this value is 22.15 g in case of feral pigeons. By the results, it can be concluded that – taking the average bird number that could be observed at the farms into account – the economical loss caused by fodder consumption is not significant. However big farms attracting a bigger bird mass, where the average bird number could exceed the 500 individuals, should count with 100000 to 200000 HUF loss annually.

6. Publications

Publications in the subject of thesis

Papers:

VARGA S. (2007): Balkáni gerlék (*Streptopelia decaocto*) és parlagi galambok (*Columba livia f. domestica*) egészségi állapotának felmérése állattenyésztő telepeken Az állati influenzák és más állatbetegségek sodrában Debreceni Egyetem Agrártudományi Centrum Mezőgazdaságtudományi Kar 2007 154-161 p.

VARGA S. – JUHÁSZ L. (2006): A balkáni gerle (*Streptopelia decaocto* Friv. 1838) jelenléte, táplálkozása és állategészségügyi helyzete állattenyésztő telepeken AGRÁRTUDOMÁNYI KÖZLEMÉNYEK 2006/21 49-54 p.

VARGA S. – JUHÁSZ L. (2007): Parlagi galambpopulációk vizsgálata állattenyésztő telepeken AGRÁRTUDOMÁNYI KÖZLEMÉNYEK 2007/26 52-56 p.

JUHÁSZ L. – VARGA S. (2005): Balkáni gerle- (*Streptopelia decaocto*) populációk állategészségügyi és táplálkozásbiológiai felmérése III. Magyar Természetvédelmi Biológiai Konferencia 127. p. Eger 2005

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JUHÁSZ L. – VARGA S. (2008): A balkáni gerle, a jövő apróvadja Nimród 2008 in press

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VARGA S. (2003): Új mutációk Európából és Amerikából. Díszmadármagazin 2. 2003. 12. p.

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JUHÁSZ L - VARGA S. (2003): Ismerjük meg hazai pintyféléinket. A meggyvágó. Díszmadármagazin 5. 2003. 21-23. p.

JUHÁSZ L. – VARGA S. (2003): A zöldike. Díszmadármagazin. 2003/6.

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JUHÁSZ L. - VARGA S. (2003): A süvöltő. Díszmadármagazin 2003/8.

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- Juhász L. – VARGA S. (2003): A fenyőpinty. Díszmadármagazin. 2003/12.
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- VARGA S. (2006): Különös sirálykahibrid a Viharsarokból Díszmadármagazin 2006/7 21.p.
- VARGA S. (2006): A hazai énekesmadarak tartása – a Változás szele Díszmadármagazin 2006/8 12.-13.p.
- VARGA S. (2006): A koronásdarvokról Díszmadármagazin 2006/10 24.-26. p.
- VARGA S. (2006): 100 éve született Siroki Zoltán Díszmadármagazin 2006/11 28.p.
- VARGA S. (2006): A rózsásfejű törpepapagáj edged dilute színváltozata Díszmadármagazin 2006/12 8.p.
- VARGA S. (2007): Az albínó rózsásfejű törpepapagáj rejtélye Díszmadármagazin 2007/01 9.p.
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