Results of slaughterhouse carcass classification (capable for human consumption, capable for processing and condemned) in selected species of food animals

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ABSTRACT: Numbers of food animal carcasses classified as capable for human consumption (edible), capable for processing (conditionally edible) and condemned belong among important parameters of health status of animals both on farm level and at slaughterhouses. The figures relating to these parameters were monitored at slaughterhouses during the periods of 1989 to 1994 and 1995 to 2000. Relative numbers of food animal carcasses classified as edible increased during the period of 1995 to 2000 in comparison to the period of 1989 to 1994 in different species as follows: in cows from 77.14 to 79.48%, in heifers from 83.06 to 92.49%, in bulls from 89.62 to 95.52%, in calves from 49.20 to 63.76%, in pigs from 95.13 to 97.27%, in sheep from 93.08 to 98.08%, in goats from 68.40 to 93.08%, in horses from 64.67 to 84.41%, in chickens from 97.06 to 98.48%, in hens from 94.41 to 95.16%, in turkeys from 97.41 to 98.00%, in ducks and geese from 98.70 to 99.13% and in rabbits from 83.95 to 93.64%. The increase was proven to be statistically significant in all species, production and age groups of food animals. It can be concluded that health status of food animals at slaughter has significantly improved during the recent period in all species, production and age groups included in the study. Best health status was currently found in chickens, ducks and geese, followed by turkeys, hens, sheep, pigs, bulls, rabbits, heifers and goats. On the other hand, poor health status was found in horses, cows and especially in calves.

Keywords: food animals; capable for human consumption; capable for processing; condemned; health status; slaughterhouse

Meat is staple food since thousands of years ago. Ancient civilisations had introduced systems for slaughtering and inspection of meat and organs of animals intended for human consumption. The experience gained over centuries was subsequently incorporated into religious rules, which either prohibited consumption of certain types of meat or required specific treatment of meat. Parts of historic experience, incorporated in religious rules and supported by scientific knowledge, were later included in legal regulations covering protection of health of meat consumers. Nowadays such protection includes inspection of meat and organs at slaughterhouse stipulated by legal regulations. The results of the inspection of slaughter animals and meat at slaughterhouse are considered to be an indicator of health of food animals on farm level and at slaughter-

houses. Animal health is the parameter which is most important for the classification of meat and organs of food animals with regard to their capability to serve for human consumption. Fries (1994) emphasises the importance of inspection results arising from the inspection of slaughter animals and meat at slaughterhouses for animal health control system. It has to be noted, however, that this system does not cover the cases of death of animals during the period of fattening.

Many authors have studied animal health on the basis of findings from slaughterhouses within the framework of veterinary inspection of slaughter animals and meat. Kofer *et al.* (2001) analysed the findings in pigs from eight selected slaughterhouses during the period of years 1999 and 2000. After the inspection of more than 66 000 carcasses of pigs they found pneumonia

of different stage in 43.7% of cases, chronic pleuritis in 22.7%, chronic pericarditis in 6.8% and milk spots in liver in 45.6%. The authors concluded that the measures on farm level aimed to reduce occurrence of these findings are necessary to protect prosperity of both the farmers and the slaughterhouses.

Schuh *et al.* (2000) studied the relation between the occurrence of findings and economic effects in slaughter pigs. Frequency of different findings was analysed in the group of 6 250 slaughter pigs with regard to dressing out percentage. The results showed that pneumonia was found in 83.3% of the animals, pleuritis in 26.3%, pericarditis in 2.6%, milk spots in liver in 47.5%. Dres-sing out percentage in slaughter pigs was principally lower in the animals with pathological findings compared to healthy animals. The authors emphasised the impor-tance of feedback information system both for veterinarians and for producers.

Grest (1997) studied the occurrence of pulmonary lesions in 8 921 slaughter pigs at six large slaughterhouses. Most frequent findings were bronchopneumonia (21%) and diffuse pleuritis (21%).

Lis (1998) analysed the findings in pigs slaughtered in 1994. In more than 14 million of animals there was pathological finding in 36.57%. In total 0.64% of carcasses were classified as condemned, of inferior quality and conditionally edible (for processing purposes only). Lis (1997) also studied the findings in cattle slaughtered in 1994. In more than 1.7 million heads of slaughtered cattle, pathological finding was reported in 21.9% of animals and 0.88% of carcasses were classified as condemned, of inferior quality and conditionally edible.

In another work Lis (1999) compared the occurrence of findings within the framework of slaughter animals and meat inspections carried out in 1987 and 1997. In 1987 pathological findings were reported for 43.79% of cases in cattle, 42.68% in calves, 23.53% in sheep, 33.21% in pigs and 21.21% in horses. In 1987 the same values were 20.5% in cattle, 2.85% in calves, 48.96% in sheep, 41.43% in pigs and 18.10% in horses. In total 2.63% of all carcasses were classified as condemned, of inferior quality and conditionally edible. In 1997 the same values as above were 20.5% in cattle, 2.85% in calves, 48.96% in sheep, 41.43% in pigs and 18.10% in horses. In total 2.63% of all carcasses were classified as condemned, of inferior quality and conditionally edible.

Libelt (2001) analysed the occurrence of findings resulting from the inspection of slaughter poultry (chickens, hens, turkeys and geese) at slaughterhouses in Poland between 1996 and 1999. Qualitative changes, especially emaciation and insufficient bleeding, were found in 0.45% of almost 1 056 million of slaughtered

chickens. These changes occurred two times more frequently than infectious or parasitic diseases of poultry. Radkowski *et al.* (1996) studied numbers of cases when infectious and parasitic diseases were detected during inspection of slaughter poultry (chickens, hens and turkeys) at slaughterhouses in the region of Olsztyn in Poland during the period of 1986 to 1991. Out of total number of 37 million birds, 1.66% were classified as condemned. Highest values were found in hens (2.4%), lowest in chickens (1.27%).

The aim of the present work was to compare the numbers of food animal carcasses classified as capable for human consumption (edible), capable for processing (conditionally edible) and condemned as reported during the periods of 1989 to 1994 and 1995 to 2000, as well as to determine the trends in numbers especially of food animal carcasses capable for human consumption in different species, production and age groups of food animals. The present work also includes the identification of the species, production and age groups of food animals with largest number of carcasses classified as edible, which reflects best health status.

MATERIAL AND METHODS

Veterinary inspectors recorded total numbers of animals slaughtered, numbers of carcasses classified as edible, conditionally edible and condemned. The data were collected in selected species, production and age groups of food animals at slaughterhouses in the Czech Republic in the periods of 1989 to 1994 and 1995 to 2000. Selected species, production and age groups included cows, heifers, bulls, calves, pigs, sheep (including lambs), goats (including kids), horses (including foals), chickens, hens (and roosters), turkeys, ducks and geese, rabbits (and coypus). The data were entered into a computer system and sent for processing to the information centre of the State Veterinary Administration. On the basis of this information comparisons were made in the numbers of carcasses classified as edible, conditionally edible and condemned in selected species, production and age groups of food animals. Furthermore the numbers of carcasses classified as edible, conditionally edible and condemned were mutually compared among selected species, production and age groups of food animals. This way the species, production and age groups with highest numbers of carcasses classified as edible and with lowest numbers of carcasses classified as conditionally edible and condemned were identified. Statistical calculations were carried out using χ^2 test (Unistat software).

RESULTS

Relative numbers of food animal carcasses classified as edible, conditionally edible and condemned result from absolute numbers of all food animals slaughtered during the periods of 1989 to 1994 and 1995 to 2000. The figures for selected species, production and age groups of food animals are presented in Table 1. Comparison of relative numbers of food animal carcasses classified as edible, conditionally edible and condemned during the periods of 1989 to 1994 and 1995 to 2000 is presented in Table 2. The data of Table 2 indicate that in selected species, production and age groups of food animals there were changes in numbers of carcasses classified as edible, conditionally edible and condemned during the period of 1995 to 2000 versus 1989 to 1994. Relative numbers of carcasses classified as edible increased in all of the selected species, production and age groups of food animals. The increase was of high statistical significance. Relative numbers of carcasses classified as conditionally edible decreased in all of the selected species, production and age groups of food animals. The decrease was of high statistical significance. Relative numbers of carcasses classified as condemned increased with high statistical significance in cows, calves, ducks and geese. Relative

numbers of carcasses classified as condemned decreased with high statistical significance in heifers, bulls, pigs, sheep, goats, horses, chickens, hens, turkeys and rabbits.

Table 2 and Figure 1 present the comparison of numbers of carcasses classified as edible, conditionally edible and condemned among selected species, production and age groups during the period of 1995 to 2000. The results indicate that differences were found in the numbers of carcasses classified as edible, condi-tionally edible and condemned among selected species, production and age groups during the period of 1995 to 2000. Highest relative numbers of carcasses classified as edible were found in ducks and geese and in chickens, followed by sheep, turkeys, pigs, bulls, hens, rabbits, goats and heifers. Lowest relative numbers of carcasses classified as edible were found in horses, cows and especially in calves. Lowest relative numbers of carcasses classified as conditionally edible were found in ducks and geese and in chickens, followed in ascending order by sheep, turkeys, hens, pigs, bulls, goats, rabbits and heifers. Highest relative numbers of carcasses classified as conditionally edible were found in horses, cows and especially in calves. Lowest relative numbers of carcasses classified as condemned were found in pigs, followed in ascending order by bulls, sheep, tur-

Table 1. Absolute numbers of animals slaughtered by selected species of food animals

Species, production and age group	A	B	B/A
	period of 1989–1994	period of 1995–2000	ratio of figures from both periods
Cows	2 468 441	1 327 544	0.54
Heifers	754 040	386 716	0.51
Bulls	2 341 935	1 489 000	0.64
Calves	558 573	160 569	0.29
Pigs	28 929 807	27 014 831	0.93
Sheep	537 254	47 573	0.09
Goats	6 607	14 335	2.17
Horses	3 739	5 034	1.35
Chickens	407 025 923	607 588 325	1.49
Hens	4 4702 794	3 5072 994	0.78
Turkeys	8 139 210	9 432 904	1.16
Ducks	18 483 332	10 876 471	0.59
Rabbits	8 775 206	7 986 762	0.91

Explanations:

sheep = sheep and lambs, goats = goats and kids, horses = horses and foals, hens = hens and roosters, ducks = ducks and geese, rabbits = rabbits and coypus

Table 2. Relative numbers of carcasses in selected food animal species classified as capable for human consumption (edible), capable for processing (conditionally edible) and condemned

	Edible (%)		Conditionally edible (%)		Condemned (%)	
	1989–1994	1995–2000	1989–1994	1995–2000	1989–1994	1995–2000
Cows	77.14	79.48[**]	16.43	11.89[**]	6.43	8.64[**]
Heifers	83.06	92.49[**]	13.40	5.21[**]	3.54	2.30[**]
Bulls	89.62	95.52[**]	9.06	3.85[**]	1.32	0.58[**]
Calves	49.20	63.76[**]	31.55	15.96[**]	19.26	20.28[**]
Pigs	95.13	97.27[**]	3.95	2.20[**]	0.92	0.53[**]
Sheep	93.81	98.08[**]	4.08	1.27[**]	2.11	0.65[**]
Goats	68.40	93.08[**]	24.05	4.27[**]	7.55	2.65[**]
Horses	64.67	84.41[**]	24.53	10.59[**]	10.81	5.01[**]
Chickens	97.06	98.48[**]	1.69	0.53[**]	1.25	0.99[**]
Hens	94.41	95.16[**]	2.05	1.40[**]	3.54	3.44[**]
Turkeys	97.41	98.00[**]	1.83	1.35[**]	0.76	0.65[**]
Ducks	98.70	99.13[**]	0.79	0.13[**]	0.51	0.73[**]
Rabbits	83.95	93.64[**]	13.01	5.16[**]	3.04	1.20[**]

Explanations:

[**] = high statistical significance ($P < 0.01$) in the numbers of carcasses during the period of 1989 to 1994 vs 1995 to 2000

sheep = sheep and lambs, goats = goats and kids, horses = horses and foals, hens = hens and roosters, ducks = ducks and geese, rabbits = rabbits and coypus
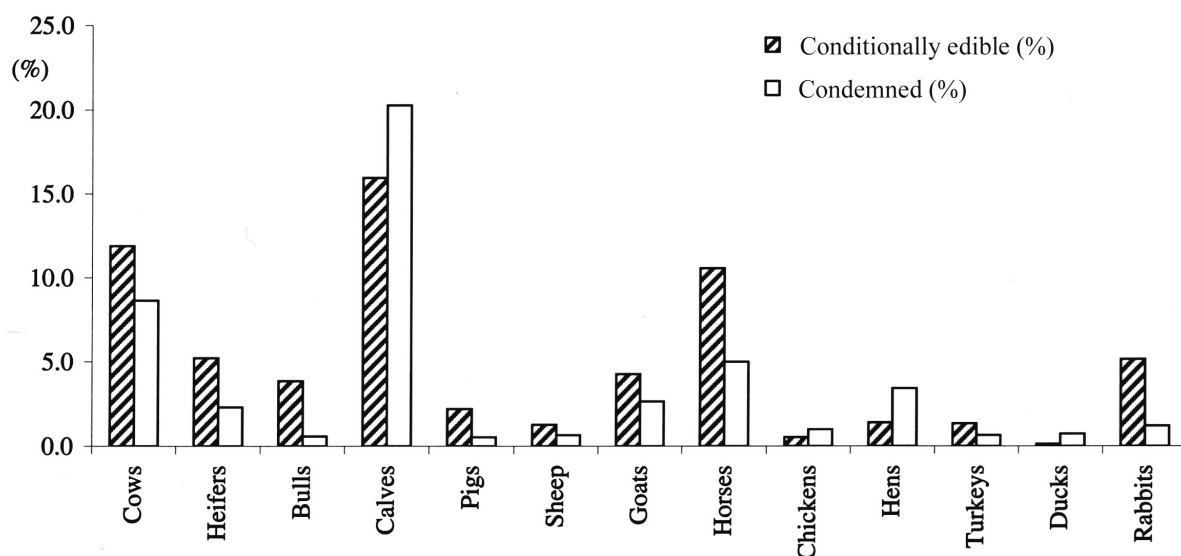

Figure 1. Percentage of food animal carcasses classified as capable for processing (conditionally edible) and condemned in the period 1995 to 2000

keys, ducks and geese, chickens, rabbits, heifers, goats, hens, horses and cows. Highest relative numbers of carcasses classified as conditionally edible were found in calves. The differences in relative numbers were of high statistical significance.

DISCUSSION

The numbers of carcasses classified as edible, conditionally edible and condemned reflect health status of food animals on farm level and at the places where food animals are handled. However, Fries (1994) notes that the parameters mentioned above do not take into account certain cases of e.g. deaths of animals during fattening on farms and during transport. The results presented by Kofer *et al.* (2001), Schuh *et al.* (2000), Grest *et al.* (1997) and also Lis (1997, 1998, 1999) indicate that pathological changes are found in significant numbers of organs of food animals inspected. Nevertheless the works in cattle by Lis (1997), in pigs by Lis (1998) and in different species of food animals by Lis (1999) suggest that total number of food animal carcasses classified as unsuitable, of inferior quality and conditionally edible was less than 1% and lower in 1997 than in 1987, which means that the proportion of carcasses classified as suitable increased between these two years. In chickens Libelt (2001) reported 0.45% of qualitative changes in the findings at slaughterhouses. These changes occurred two times more frequently than infectious or parasitic diseases in poultry.

In our work we found increased relative numbers of carcasses classified as edible. It can be therefore concluded that in the recent period health status of food animals has been significantly improved on farm level and at the places where food animals are handled. This applies to all of the selected species, production and age groups of food animals. In accordance with these results it was also found that relative numbers of carcasses classified as conditionally edible were lower in all of the selected species, production and age groups of food animals. Relative numbers of carcasses classified as condemned were also lower in all of the selected species, production and age groups, except for calves, cows, ducks and geese. The new situation is based on strict enforcement of new veterinary legal regulations and legal regulations for the protection of animals against cruelty. The regulations cover the areas of food animal nutrition, animal husbandry, hygienic requirements and requirements for housing to limit cruelty and animal suffering, as well as protection of animals during their transport to slaughterhouse. In addition, lower

consumption of meat produced by slaughterhouses was the reason for closing down many farms in some species, production and age groups of food animals. The farms with bad conditions were mostly among those that were closed down, which was consequently reflected in overall improvement of health status of food animals during the period of 1995 to 2000. This was demonstrated by increased proportion of carcasses that were classified as edible.

During the recent period best health status on the basis of proportion of carcasses classified as edible was found in ducks, geese and chickens, followed in descending order by sheep, turkeys, pigs, bulls, hens (and roosters), rabbits (and coypus), goats, heifers, horses and cows. Worst health status was detected in calves. High level of health status of slaughter chickens and also ducks and geese in comparison to other selected species, production and age groups of food animals is due to specialisation in poultry production with typical features of advanced nutrition, fulfilment of husbandry and hygiene requirements and strict control of health in these species and production groups. The findings in poultry thus confirm the data by Radkowski *et al.* (1996) indicating lower occurrence of condemned carcasses in chickens than in hens. Worst health status in horses is due to the fact that horses are principally not kept as food animals, and therefore they are mostly slaughtered because of disease, injury, low performance, etc. Therefore the proportion of emergency slaughters in horses is relatively high. The situation in cows is somewhat similar, since dairy cows are slaughtered because of disease, injury, low production or reproductive disorders. Calves are not principally kept to be slaughtered either. Those that are found at slaughterhouses have been culled due to disease, injury or poor growth, and remain unsuitable to be kept further and to produce milk or beef later on. Conse-quently also in calves the proportion of emergency slaughters from the total number of slaughters is high. On the other hand, the species, production and age groups of animals kept in large scale to be slaughtered for meat show high proportion of carcasses classified as edible. This applies especially to bulls, pigs, turkeys, ducks and chickens.

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