

ECONOMIC ASPECTS OF TERRITORIAL ANIMAL HEALTH PROGRAMME CONTRIBUTING TO FOOD PRODUCTION AND ZOOSES REDUCTION

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Les aspects économiques du succès d'un programme de santé animale à long terme sont analysés à l'échelle du pays. La préparation du programme, sa réalisation et les résultats en terme de réduction de conséquences sur la production des élevages et en terme de santé publique, sont décrits. Les résultats contribuent d'une manière décisive à atteindre au plan national l'autosuffisance alimentaire en production animale et à réduire l'incidence des zoonoses dans la population humaine. Des Services vétérinaires nationaux forts en terme d'effectifs humains, de matériel et d'installations sont des facteurs déterminants pour la réussite de programmes d'éradication et de contrôle des maladies animales. Les coûts des Services vétérinaires unifiés au niveau du pays sont relativement peu élevés en comparaison de l'accroissement de production animale nationale et des enjeux de la sécurité alimentaire. Le ratio, coût des Services vétérinaires sur coût de la production animale est inférieur à 0,01. Pour des programmes spécifiques, le coût/bénéfice aura atteint une valeur supérieure à 1, seulement au bout de plusieurs années. Le bénéfice de la protection de la santé des animaux a augmenté chaque année et se reporte d'une année sur l'autre grâce aux nouvelles générations d'animaux. On a donc utilisé les bénéfices cumulés et non les avantages appliqués aux produits. Prendre en compte le bénéfice/coût cumulé pendant une certaine période conduit à une meilleure évaluation de l'efficacité des programmes de lutte. Les critères monétaires ne sont pas utilisables pour l'évaluation de la préservation des vies humaines.

At the end of the fifties Czech government authorities decided to start programme against major animal diseases to improve animal population health with the aim to contribute to food production and to human health protection against diseases transmissible from animals. The programme covered total territory (78 864 km²) with about 3.5 million heads of cattle, almost 5 million pigs and more than 30 million chickens in predominating large scale production systems. Human population was about 10 million inhabitants. This paper analyzes 30 years' period - 1959-1988.

PROGRAMME PREPARATION

New concept (priority to preventive medicine), strategy, legislation (veterinary law and government resolution), methods, organization and management to fit for the programme were introduced during 1959-1960. Unified state veterinary service manpower, material (equipment, supplies) and budget were strengthened. A dense network of well staffed and equipped diagnostic laboratories (one central, 14 provincial and 35 regional) was developed. New institutes for research, postgraduate education, production and control of diagnostics and vaccines and for veterinary extension as well as a network of rendering plants were built during initial stages. Priority diseases with success probability were selected, considering disease occurrence, economic consequences, public health impact, social and biological importance, solution feasibility, availability of effective methods (proved by pilot tests) and of necessary inputs. The highest priority was given to eradication (to reach zero prevalence and incidence) of bovine brucellosis by 1964 and elimination (to reach zero prevalence) of bovine tuberculosis by 1968. Selected diseases' reference laboratories and advisory groups of the best specialists were set up. Particular reporting, information and analyses systems were established. Veterinary extension helped to attract farmers' and public support.

PROGRAMME IMPLEMENTATION

In all ranches, regions and provinces objective-oriented animal health programmes were elaborated and carrying out according to government decision and national veterinary directorate instructions. High level inter-resort national, provincial and regional committees were coordinating programme activities. Epizootiologists (national, provincial and regional) were in charge of professional management, supervision and major problems' solution. State veterinarians in field practice had the key part in programme implementation. Intensive field and abattoir investigations to discover all diseased herds were largely supported by laboratory tests. Particular attention was given to critical moments (e.g., animals' transfer) and places (e.g., quarantines, markets, genetic herds). Early discovery of diseased herds and animals was providing opportunity for prompt and effective application of the measures. State veterinarians working daily among farm animals and systematically testing healthy herds as well as veterinarians in abattoirs played decisive role in finding out population health reality. Postgraduate training contributed to the uniformity in application of diagnostic and control methods. Programmes and methods were periodically evaluated, adjusted and updated according to new experience and research results.

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COST OF VETERINARY SERVICE AND MEASURES

The budget of state veterinary service was covering preventive, control, curative and inspection activities as well as facilities construction. Average annual budget was 502 mil. korunas - Kcs (average exchange rate was 10 Kcs = 1 US\$; inflation was close to zero), i.e. it was spent 15 060 mil.Kcs during evaluated period. About 5/10 was for salaries, 3/10 for material, 1/10 for new buildings and reconstruction, 1/10 for travel and other expenses. Thanks to convincing results of the programme the budget could be gradually strengthened reaching 688 mil.Kcs in 1988 (77 % was for grass-root level activities in regions, 13 % for diagnostic laboratories, 7 % for management, etc.). In that year the service had 8548 employees (e.g., 2551 veterinarians in regions; more than 1000 employees, incl. 250 veterinarians, in diagnostic laboratories, etc.). Vaccine production factories and rendering plants were self-financed with limited state contribution. Research institute was financed separately. Programme activities were for the farmers and livestock enterprises free of charge.

On the other hand, state veterinary service income for curative activities (in field, clinics and hospitals), preventive measures (provided to all ranches according to annual contracts), etc. was reaching in average 246 mil.Kcs annually, i.e. during the evaluated period the income was 7 370 000 mil.Kcs. Maximum income was reached in 1988 (435 mil.Kcs). Hence net cost of the veterinary service was in average 256 mil.Kcs annually (in 1988 - 253 mil.Kcs), i.e. total was 7 680 mil.Kcs.

Cumulative livestock output value reached 1 867 687 mil.Kcs (annual average was 62 256 mil.Kcs) during 1959-1988; comparing with cumulative veterinary service cost following results were received:

- Ratio cumulative vet. service gross cost / cumulative livestock output = 0.0081
- Ratio cumulative vet. service net cost / cumulative livestock output = 0.0041.

In 1988 national agriculture output was 7 9371 mil.Kcs, i.e. 9.48 % of gross national output. Livestock output was 46 611 mil.Kcs, i.e. 58.73 % of agriculture output. For comparing of state veterinary service cost with livestock output and value (about 50 000 mil.Kcs of protected food animal populations) following indicators were used:

- Ratio vet. service gross cost / livestock output = 0.0148
- Ratio vet. service net cost / livestock output = 0.0054
- Ratio vet. service gross cost / livestock output + value = 0.0071
- Ratio vet. service net cost / livestock output + value = 0.0026.

For emergency (e.g., FMD) special fund was available. Selected specific programmes were supported also from other part of government budget as the subsidies (e.g., for elimination of tb cattle 695 mil.Kcs during 1960-1968, for eradication of Aujeszky's disease in pigs - 215 mil.Kcs during 1981-1987). Insurance agency supported programmes against bovine brucellosis, bovine tuberculosis and Aujeszky's disease in pigs with about 400 mil.Kcs.

REDUCTION OF ANIMAL POPULATION DISEASES OCCURRENCE

Thanks to successful implementation of the programme, disease free status (OIE standard) was reached in bovine brucellosis (eradicated by 1964 using radical method and intensive serological testing after prohibition of vaccination), bovine tuberculosis (eliminated by 1968 using radical method and intensive allergic testing), enterovirus encephalomyelitis of pigs (1973), foot-and-mouth disease (1975), bovine trichomoniasis (1976), hog cholera (1979), Newcastle disease (1980), transmissible gastroenteritis of pigs (1981), bovine trichophytosis (1984), porcine brucellosis (1985), bovine genital campylobacteriosis (1986), Aujeszky's disease in pigs (1987), enzootic bovine leucosis (1992), bovine babesiosis and hypodermosis. Fascioliasis and pulmonary helminthiasis in cattle and sheep were reduced almost to zero prevalence. Many other diseases, infectious and non-infectious, were reduced.

Radical method proved to be the most effective in several diseases. During the programme 1 136 913 heads of cattle (78 % were cows) affected by tuberculosis, 790 herds (ranches) affected by bovine brucellosis with 150 000 heads of cattle, 640 herds affected by Aujeszky's disease with 900 000 pigs, etc. were replaced by healthy herds and animals.

IMPROVEMENT OF ANIMAL POPULATION PRODUCTION

The programme contributed as main factor to animal production output, productivity and reproducibility improvement: Examples comparing initial (1959) and final (1988) values: gross livestock output increased from 23915 mil.Kcs to 46611 mil.Kcs, i.e. by 94.90 %; meat total from 621000 MT to 1273000 MT, i.e. by 104.99 %; beef from 236000 MT to 515000 MT, i.e. by 118.22 %; pork from 361000 MT to 750000 MT, i.e. by 107.75 %; poultry meat from 43000 MT to 194000 MT, i.e. by 351.16 %; milk from 2563 to 4763 mil. liters, i.e. by 85.84 %; eggs from 1606 to 3643 mil. pieces, i.e. by 126.84 %, milk/cow/year from 1790 to 3847 liters, i.e. by 114.91 %; eggs/hen from 108 to 248, i.e. by 129.63 % and calves/cow/year from 0.81 to 1.03, i.e. by 27.16 %. Producers' income increased accordingly. Country self-sufficiency in production of food of animal origin was reached. Import of animals and their products could be reduced almost to zero under very strict conditions improving protection against introduction of diseases from abroad.

REDUCTION OF ZONOSSES IN HUMAN POPULATION

During evaluated period the occurrence of zoonoses in human population was reduced significantly. Values of saved human lives and health cannot be expressed in monetary terms.

The major result was zero incidence of human brucellosis caused by *Brucella abortus* after eradication of this disease in cattle in 1964. It was estimated saving about of 1 750 persons from this zoonosis during following 25 years (cumulative benefit avoiding new 70 cases reported annually before starting the programme).

Elimination of bovine tuberculosis (in 1960 every third cow was tb positive) conducted to reduction of reported cases of bovine tb in humans. This number was reduced from thousands at the beginning to 8 very old cases (infected decades ago) discovered in 1988. No more new cases in children were reported after 1970.

Reduction of cattle trichophytosis (*T. verrucosum*) to zero prevalence of infected herds caused that the number of reported new cases of all human trichophytoses fell from 1316 in 1965 to 110 in 1985, i.e. twelve times.

BENEFIT / COST RATIOS

The delay of benefit against cost was serious problem for benefit/cost (B/C) evaluation of animal health programmes. It took time to reach $B/C > 1$. It was not easy to convince decision-makers on input effect (return) when during initial stages B/C was minor than 1. In case of bovine tb annual $B/C > 1$ was reached after 2 years and cumulative $B/C > 1$ after 3 years. However, successful programme benefit was increasing every year. Examples (values in mil.Kcs):

Disease	Programme		Initial Annual Loss	Cumulative Benefit			Cum. Benefit/Cost Ratio		
	Duration	Cost		at end	after 5y	after 10y	at end	after 5y	after 10y
Bovine tb	1959-68	1489	1039	4799	9994	15189	3.22	6.71	10.20
Aujeszky's d.	1981-87	650	250	1750	3000	4200	2.69	4.62	6.46

Cumulative benefit was applied for saved lives and health being reproduced, i.e. transferred to new generations avoiding previous losses. B/C would be even much higher if the cost, as inanimate input value, were discounted.

CONCLUSION

Strong state veterinary service in terms of manpower, material, facilities and budget proved to be the key factor for successful territorial animal population health programme eradicating and reducing major diseases. The results contributed decisively to reach country self-sufficiency in food of animal origin and to reduce zoonoses in human population. Cost of unified and centrally budgeted state veterinary service was relatively very low in comparison with increasing national livestock output and with the value of protected food animal populations. Ratio of veterinary service net cost to livestock output was minor than 0.01. Specific programmes' benefit/cost ($B/C > 1$) was reached only after certain period of $B/C < 1$. Benefit of saved animal lives and health was increasing being transferred, due to the reproduction, to new generations avoiding previous negative consequences. Therefore, it was used benefit cumulation and not discount applicable for inanimate values. Considering B/C also after several periods provided more objective evaluation of animal health programme efficiency. Monetary criteria are not suitable for evaluation of saved human lives and health values.

BIBLIOGRAPHY

- Anon., 1961-1988. Anthroozoonoses Surveillance Yearbook. State Veterinary Administration, Prague.
- Anon., 1959-1988. Statistics Yearbook of Czech Republic. State Statistical Office, Prague.
- Anon., 1959-1988. Technical and Economic Complex Analysis Yearbook. State Veterinary Administration, Prague.
- Anon., 1961-1988. Veterinary Statistics Yearbook. Inst. for Vet. Extension, State Veterinary Administration, Prague.