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MUTUAL RELATIONSHIPS BETWEEN HUMANS AND ANIMALS IN TERMS OF THEIR WELFARE

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Abstract

The aim of this study was to present selected relationships between humans and animals in terms of their welfare. The human–animal relationship is reciprocal and symmetrical, and the interdependencies between them should be considered in terms of physical and mental health as well as social, environmental and economic benefits. Comprehensively studied animal welfare is closely related to humane treatment by humans and to ensuring the possibility of expressing natural behavioural needs within the framework of at least a "life worth living". The "Five Freedoms" model has set international standards for assessing the welfare of farm animals. An overly narrow understanding of animal welfare, which regards biological criteria and production efficiency as fundamental, negatively affects human welfare through continuously acting stressors. Animal housing and feeding models that differ from intensive systems have a beneficial effect on both animal and human health. Extensive farming under enhanced-welfare conditions can be an alternative method meeting the needs of consumers who, for ethical and environmental reasons, critically assess intensive production methods.

Keywords: human–animal relations, animal and human welfare

Introduction

A functional human–animal relationship is, in principle, bidirectional. An optimal relationship consists in providing the animal with a high level of welfare, so that an animal maintained in good welfare in turn contributes to human well-being. Interdisciplinary studies of the effects of farm animals on people indicate a close relationship between the housing model and work environment and human health (Pol et al., 2021; Torske et al., 2024). Human and animal welfare and environmental quality in the context of animal production are interconnected (Albernaz-Gonçalves et al., 2021).

The nature of the relationship between people and farm animals affects both parties. Interactions or relationships established between them within the production process at farm

level significantly affect both the people involved and the animals. It is extremely important that these interactions are positive and reflect a genuine sense of care on the part of people who have direct contact with animals (Marmelo, 2022). The human–animal relationship affects animal performance (Hemsworth, 2003; Kauppinen et al., 2012) as well as animal health and welfare (Hemsworth and Coleman, 2010; Zulkifli, 2013). Good human–animal relationships can reduce fear and stress associated with human presence and human actions directed towards animals (Boissy, 1995). In people, the human–animal relationship affects working conditions, quality of life, health and safety (Hemsworth et al., 2018). Results of studies on animal handling, field observations of interactions between humans and domestic animals, and intervention studies in the livestock sector on links between human attitudes, human behaviour, animal behaviour and stress physiology provide evidence of causal relationships among these human- and animal-related variables. The human–animal relationship is also an important element of the social acceptance of animal production, because to some extent it characterizes the professional ethics of farmers/breeders/producers (Larrère and Larrère, 2000). Positive human–animal relationships are a component of positive welfare for both parties (Vigors and Lawrence, 2019).

The relationship between a human and an animal is reciprocal and symmetrical (Kaleta, 2005; Pol et al., 2021). Interdependencies may be considered in the spheres of (i) physical health (quality of meat consumed, less harmful environmental impact of extensive housing systems), (ii) mental health (satisfaction of the farmer/breeder, official and veterinarian arising from ethical treatment of animals, and consumer satisfaction from supporting humane methods of animal use), and (iii) social and economic benefits (extensive production promotes rural cultural heritage, the profession of the individual farmer, small-scale production, support for conserved breeds and counteraction against vertical concentration in markets for animal products). An asymmetrical relationship in which one party exploits the other without giving anything in return – without providing a "life worth living" or a "good life" – does not fall within the category of ethical treatment of animals. Such a disturbance will be mirrored by impaired human well-being.

Animal production and the working conditions of breeders/producers have changed significantly in recent years. Modern agriculture faces economic, health, environmental and ethical challenges, and the concept of interdependent human and animal welfare is now more relevant than ever before (Beaujouan et al., 2021). The aim of this paper is to present selected relationships between humans and animals in terms of their welfare.

Welfare

Well-being means an individual's subjectively perceived sense of satisfaction with the physical (health, physical condition), mental and social state of their own life. Animal welfare is a broad term and can be defined in several ways. It includes the five well-known freedoms based on the report of the Brambell Committee (Brambell, 1965; Johnson et al., 2019). The "Five Freedoms" model established international standards for assessing farm animal welfare and has been incorporated into recommendations for farmers and educational programmes. Animal welfare encompasses physical and mental health in various aspects, such as physical comfort, freedom from hunger and thirst, and the ability to express motivated behaviours, i.e. behaviours directed towards achieving a specific goal or satisfying a need (Nadlučnik et al., 2022). According to the World Organisation for Animal Health, "an animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state" (WOAH, 2008). This model has been criticized for emphasizing primarily objective criteria, namely the provision of basic conditions for biological survival. Freedom

from hunger, thirst, environmental discomfort, fear and distress does not in itself guarantee proper welfare or attainment of the standard of a "life worth living" (Mellor, 2016).

An attempt to bring welfare recommendations closer to practical implementation and to strengthen recognition of animals as subjects with their own needs was the concept of the "Five Domains" of welfare compromise (Mellor, 2016; Mellor et al., 2020). It originally referred to laboratory animals and was subsequently extended to farm animals. Its authors emphasized the need to take into account threats to each freedom, recognizing that welfare restrictions in the physical and behavioural domains will be reflected in the mental domain.

Three basic scientific concepts and approaches to the study of welfare have been developed. The first links animal welfare with the natural environment (Fraser, 2008; Carenzi and Verga, 2009; Czychol et al., 2015; Johnson et al., 2019). Animals should live in an environment that allows them to behave naturally (Prunier et al., 2010). The second links welfare to biological functioning, i.e. how an animal adapts to different environmental conditions (Fraser, 2008; Johnson et al., 2019). The third concerns subjective feelings or affective states (Fraser, 2008; Carenzi and Verga, 2009; Czychol et al., 2015; Johnson et al., 2019). Feelings may be negative, including subjective states such as hunger, thirst, pain, fear and frustration, or positive, including states such as comfort and satisfaction from certain social interactions (Carenzi and Verga, 2009; Johnson et al., 2019).

Pig welfare is a strategic pillar of sustainable development in the pig industry (Huanca-Marca et al., 2025). Ninety-five welfare indicators have been identified and divided into physiological, behavioural, health, post-mortem and product-quality categories. The number and diversity of these indicators suggest that animal welfare may in practice be perceived and understood differently by different people (Hewson, 2003). It is therefore important to ensure that definitions of animal welfare and productivity are at least approximately the same for all concerned. According to Jääskeläinen et al. (2014), there are links between farmers' attitudes, animal welfare and productivity. Most farmers have no doubt that animal welfare is strongly related to performance. Others express the view that high productivity does not necessarily reflect optimal welfare, and that an animal living in adverse environmental conditions or suffering from various problems may still produce well (Jääskeläinen et al., 2014). According to the Scientific Veterinary Committee (1997), good productivity should not be treated as conclusive evidence of good welfare. Most farmers perceive their own attitudes as important factors shaping welfare and also emphasize the influence of herd management on the welfare and productivity of their animals (Hubbard and Scott, 2011; Jääskeläinen et al., 2014). Good stock management and motivation are, in Hemsworth's (2007) assessment, important factors improving animal welfare and productivity. Farmers whose animals show the best productivity are those who pay the greatest attention to animals in their work (Pol et al., 2021).

Human–animal relationship

The human–animal relationship modulates animal welfare, including health, productivity and product quality. It may be asked whether human well-being – that of the farmer/breeder – is necessary for animal welfare and whether animal welfare affects the well-being of people: producers/breeders, consumers and, more broadly, rural and urban residents who share the same space and environment.

Kauppinen et al. (2012) studied the direct effect of human attitudes on the welfare of farm animals used for food production. The relationship between farmers' attitudes towards improving pig welfare and productivity was assessed using psychosocial, production and demographic data from 124 farms. Farmers' attitudes, subjective norms and perceptions of the importance of, and improvement in, animal welfare were significantly associated with productivity. The strongest factor associated with production parameters was the perceived importance of scientists and other specialists as sources of subjective norms: valuing scientists' recommendations was associated with more piglets

born, lower mortality and more piglets weaned. Providing animals with a favourable environment was negatively correlated with piglet mortality. The importance attached to humane treatment of animals was positively correlated with the number of piglets weaned. A favourable result was positively perceived by the farmer and helped satisfy his or her own well-being. Analysis of production parameters confirmed that farmers with clearly positive attitudes towards production results (except for perceived ease of satisfying their own welfare) obtained 0.34–0.54 more piglets per litter than average farmers. Kauppinen et al. (2012) showed that farmers' attitudes were more strongly correlated with production parameters of primiparous sows and their piglets than with multiparous sows and their offspring. Farms with good production results were those in which farmers had more positive attitudes towards animals, followed subjective norms and controlled animal-welfare practices (Kauppinen et al., 2012; Hayes et al., 2021).

Animal welfare is gaining importance worldwide because of pressure from countries importing products of animal origin and because of the needs, requirements and expectations of a more aware society concerning the living conditions of farm animals (Vicentini et al., 2017). Vicentini et al. (2017) investigated whether stockperson welfare is essential for animal welfare. The treatment of animals is related to the attitudes and behaviour of stockpeople, which are associated, among other things, with their initial experience in a given activity. The authors examined links between positive employee attitudes towards animals and the resulting effects on animal welfare and productivity. Human-related issues were emphasized. Efforts are being made to understand the mechanisms underlying changes in people's attitudes and behaviour towards farm animals. More factors than a temporary change in attitude are involved in the search for more favourable animal handling. Training programmes focused on stockperson attitudes and behaviour may be effective and offer good solutions for improving human–animal interactions (Hemsworth, 2007; Vicentini et al., 2017). It is necessary to understand workers' emotions, their effects on routine animal-handling activities, and how these people's views can be changed to improve the welfare of both humans and animals. According to Vicentini et al. (2017), the needs of both parties should be considered and investments should be directed towards training and development of livestock workers. Such measures may be important for human–animal relationships and may affect the welfare of both groups – animals and farm workers. The study confirmed a direct relationship between the welfare of animals and farm employees (Vicentini et al., 2017).

Studies of human–animal relationships have focused on stress, production performance and meat quality (Hemsworth, 2003; Hemsworth et al., 2009; Zulkifli, 2013; Tallet et al., 2005, 2018). Animals may perceive interactions with humans in different ways: negative interaction (they fear humans and avoid contact), neutral interaction (fear is low but animals still avoid human contact), and positive interaction (absence of fear and acceptance of physical contact) (Claxton, 2011; des Roches et al., 2016). Negative treatment – shouting, hitting, kicking, use of physical force and electric prods – leads to high levels of fear and acute and chronic stress, negatively affects behaviour, welfare, health and productivity (Hemsworth et al., 2000; Hemsworth, 2009; Hemsworth and Coleman, 2010; Fraser et al., 2013; Johnson et al., 2019), and reduces meat quality (Cornish et al., 2016). Piglets show aversive behaviour towards stockpeople and withdrawal at weaning. In growers and finishers, body-weight gain decreases and nervousness occurs during prophylactic and therapeutic procedures. In males, testicular size decreases and acquired reluctance of boars to mate may develop, while in sows mating success (percentage of pregnant sows) decreases (Mota-Rojas et al., 2020). In practice, a positive human–animal relationship means absence of fear, which greatly facilitates animal handling (Waiblinger et al., 2006).

Patting, talking to animals and providing food have positive effects: they reduce fear, animals become more trusting and do not avoid people (Graml et al., 2008). A positive attitude of the stockperson towards animals often promotes higher productivity (Rushen and de Passillé,

2015). Sows achieve better reproductive success, expressed as the number of offspring per litter and over the whole productive life, and show a stronger maternal instinct (Janczak et al., 2003). Understanding and managing human attitudes in order to reduce animal stress not only makes it possible to increase farm productivity but also improves employee well-being (Hemsworth and Coleman, 2010; Rault et al., 2020).

Physical health – selected issues

Consumer awareness of the effect of food quality on human health is increasing (Kozłowska-Strawska et al., 2017; Kasprzyk, 2020; Gębska et al., 2022; Rzoska, 2022; Olloqui et al., 2023). In addition to ethical concerns associated with intensive production, concern for human health may become a driver of change towards better treatment of farm animals (Klink-Lehmann, 2023). Benefits to consumer health outweigh ethical and environmental motivations. Although these three spheres are interdependent and inseparable, the demand for healthy food may become the most effective catalyst for change. The One Health concept may have a similar effect. Its proponent William Karesh (2020) argues that boundaries between the health of humans, wildlife and farm animals are artificially created: there is only one world and one health. On 13 November 2023 in Luxembourg, the European Food Safety Authority (EFSA), European Medicines Agency (EMA), European Environment Agency (EEA), European Chemicals Agency (ECHA) and European Centre for Disease Prevention and Control (ECDC) joined the One Health initiative.

Post-mortem meat quality

Post-mortem meat quality, for example pork quality, is an indicator of the quality of the rearing environment and animal housing conditions. In addition to genetic factors, the quality of feed and feed additives has a direct effect on pork quality parameters (Baum et al., 2013; Van Baelen et al., 2024).

Chronic or intermittently chronic stress induced by a housing environment inconsistent with species-specific needs causes pathological anatomical and physiological changes in pigs, including thymic atrophy, adrenal hypertrophy and reduced immunity, resulting in infections and disease (Mormede et al., 2011; Amadori and Zanotti, 2016; Pejsak and Truszczyński, 2017). These diseases, particularly common in intensive systems, cause animal suffering and deterioration in the quality of slaughter raw material (Fortier and Gagnon, 2023). A negative correlation has been confirmed between stress and inflammatory biomarkers and carcass/meat quality traits (Nastasijevic et al., 2022). In this context, it is worth noting the planned introduction in the United States, in the near future, of meat from pigs subjected to genome editing using CRISPR/Cas (Clustered Regularly Interspaced Short Palindromic Repeats). This genetic-engineering method allows manipulation of an organism's genome. The U.S. Food and Drug Administration (FDA) has given the green light to animals made resistant to porcine reproductive and respiratory syndrome (PRRS) by this method. According to Burger et al. (2024), gene editing offers hope for combating disease and improving human and animal health, including greater disease resistance. Until recently, activity in this area focused mainly on personalized medicine for human diseases such as cancer, leukaemia and haemophilia. Plant and livestock breeders can now incorporate CRISPR/Cas as a tool to combat existing and emerging diseases. Researchers used gene editing to modify the porcine CD163 gene and obtained resistance to the virus causing PRRS. The gene-editing programme introduced a single modified CD163 allele into four genetically diverse pig lines. Healthy animals resistant to PRRS virus infection were obtained and formed a founder population. CRISPR-Cas was therefore used to enable a commercial-scale editing programme. Solving the PRRS problem in pigs can be regarded as a breakthrough achievement in global agriculture. It improves animal

health, reduces mortality, lowers production costs and may reduce antibiotic use on farms. Application of this knowledge may also lead to elimination of many other livestock diseases harmful not only to pigs (such as African swine fever – ASF) but also to humans (swine influenza). According to Burger et al. (2024), this is an important step towards benefits for consumers, society and the environment.

With reference to the stress problem mentioned above, the role and importance of stress in the pre-slaughter handling of pigs should also be noted. Stress alters muscle glycogen reserves and consequently causes adverse changes in pork quality parameters (Young et al., 2009; Terlouw et al., 2021). A long fasting period of more than 22 hours depletes muscle glycogen and increases the risk of dark, firm and dry (DFD) meat (Guàrdia et al., 2005). A feed-withdrawal period shorter than 18 hours also increases the incidence of defective pale, soft and exudative (PSE) meat (Guàrdia et al., 2004; Driessen et al., 2020). Both defects are undesirable for processors and consumers.

In both cattle and pigs, certain pre-slaughter conditions – namely mixing unfamiliar animals and/or long transport – increase the risk of producing meat with a high ultimate pH (Terlouw and Rybarczyk, 2008; Foury et al., 2011; Lebret et al., 2012). In pigs, a faster heart rate or higher catecholamine levels before slaughter were correlated with a rapid early post-mortem decline in pH and a higher ultimate pH, affecting meat colour and water-holding capacity (Terlouw and Rybarczyk, 2008; Terlouw et al., 2009; Foury et al., 2011). Predicting the stress response therefore means predicting meat quality – a set of traits important to potential consumers.

Animals show a certain consistency in the way they respond to stressors, referred to as the animal's stress reactivity (Terlouw and Rybarczyk, 2008; Bourguet et al., 2015). Stress reactivity is considered high when an animal is easily threatened and shows pronounced behavioural (overt or not) and/or physiological responses. The way an animal evaluates a situation depends on animal-related factors: (i) genetic background, which is stable; (ii) previous experience, which evolves over a longer period; and (iii) the physiological state at a given moment, which may change over a short period. Because stress responses in the slaughter context affect meat quality, stress reactivity is an animal trait that influences its potential to produce high-quality meat.

Veterinary studies conducted in the Czech Republic in 2010–2017 on slaughtered pigs from conventional production (indoor housing on slatted floors/shallow bedding) demonstrated pathological post-mortem lesions (Vecerek et al., 2020). Lung lesions occurred in 41% of finishers and 24% of sows, kidney lesions in 14% and 32%, respectively, and liver lesions in 12% and 18%. The results indicated that lesions were mostly chronic, although acute pathologies were also detected. Parasitic lesions were infrequent and affected 1–4% of animals depending on the production group. The cited authors reported similar findings from studies in Austria, Italy and Poland. They pointed to the need to improve pig health on farms and to pay greater attention to welfare during pre-slaughter handling (Vecerek et al., 2020). According to Bonneau and Lebret (2010), apart from ethical implications and the level of pig welfare, the type of housing system has little influence on meat-quality parameters important for the processing industry. However, the authors note a significant improvement in the quality of pork and dry-cured products when animals are kept extensively in outdoor systems.

Content and ratio of omega-6 to omega-3 fatty acids

The ratio of ω-6 to ω-3 fatty acids is an important factor affecting the quality, taste and nutritional value of pork (Zhang et al., 2016). Saturated fatty acids, especially lauric, myristic and palmitic acids, are risk factors for cardiovascular disease in humans (coronary heart disease, arteriosclerosis), obesity and hypercholesterolaemia (Rizwan et al., 2023). Unsaturated fatty

acids such as ω-3 are beneficial to human health (Średnicka-Tober et al., 2016; Russo et al., 2017).

A consumer's awareness that they are eating a product that positively affects their health improves their well-being. Unfortunately, systematic comparative assessment of the content of ω-6 and ω-3 fatty acids and their ratio in meat from conventional and organic production is not routinely performed (Średnicka-Tober et al., 2016). Such information is obtained only in experiments supported by laboratory analyses. From the perspective of consumer welfare, it would be reasonable to introduce labelling based on random laboratory assessment of meat and meat products, with label information reflecting the health-promoting value of the product. A model could be the way information is provided to pork consumers to distinguish products from local/niche, alternative and traditional markets, enabling better purchasing choices (Rajic et al., 2022).

Studying the relationship between the ω-6:ω-3 ratio and pig feeding and housing models is important when assessing pork quality. As a starting point for broader analysis and comparison, Russo et al. (2017) used results obtained from the longissimus dorsi muscle of wild boar (Sus scrofa scrofa) hunted in Tuscany. In piglets, the ω-6 to ω-3 ratio was 9.29:1.88, while in adults it was 16.82:1.66. Analysis of meat from animals of different species, including pigs, produced in intensive, conventional and extensive organic systems indicates that diets based on grazing or feeds compliant with organic-farming standards significantly modify the fatty-acid profile (Średnicka-Tober et al., 2016). Meat from animals kept in extensive (organic) systems had similar levels of saturated fatty acids (lauric, myristic and palmitic), lower levels of monounsaturated fatty acids (oleic), and higher levels of polyunsaturated fatty acids (including α-linolenic acid – ALA, eicosapentaenoic acid – EPA and docosahexaenoic acid – DHA) than meat from conventional production. According to Średnicka-Tober et al. (2016), limiting feeds based on cereals and concentrates, particularly during the finishing period, in both organic production and other extensive models (free-range/pasture systems), may further improve the nutritional value of meat compared with intensive production methods. Further comparative research is required to quantify precisely which production-system parameters (feed ingredients, feeding system, veterinary interventions) are crucial for the most important nutrients in meat from farm animals. Budimir et al. (2020) found that meat from pigs fed concentrate mixtures in intensive production, compared with pasture-reared pigs in extensive production, was characterized by lower PUFA and MUFA contents. The final heat-treatment technique used for meat is also an important factor for human health and the fatty-acid profile (Petroman et al., 2021).

In the experiment described by Arbuckle and Arbuckle (2018), farmers in Iowa (USA) used three pig feeding models: (1) forage – grass, millet, red clover and peas, without grain (17 pigs), (2) 50% grain (50 pigs), and (3) 100% grain (8 pigs). Pigs in groups 1–3 were kept in a free-range pasture system. The diet of group 1 was supplemented with organic cow's milk. Grain in the diets of groups 2 and 3 consisted of non-genetically modified (NON-GMO) soybean and maize. Pigs in groups 1 and 2 were moved to a new pasture paddock every day during the experiment, whereas group 3 was moved every 7 days. The lipid profile of pork from finishing pigs was analysed. The ω-6:ω-3 ratio was 5.15 in group 1, 9.88 in group 2 and 13.84 in group 3. For comparison, pork from intensive production (group 4) had an ω-6:ω-3 ratio of 29.40. Total percentage intramuscular fat (IMF) in meat samples was 1.98, 3.98 and 4.12% in groups 1–3, respectively, and 1.63% in group 4; total percentage ω-3 fatty acids was 2.82, 1.84, 1.10 and 0.67%, respectively. Increasing the proportion of grain-based concentrate feed had an adverse effect on the ω-6:ω-3 ratio in pork.

Impact of intensive production on the natural environment

Intensive animal production places pressure on all natural environmental resources, biodiversity and climate, and consequently affects human well-being (Augustyńska-Prejsnar et al., 2018; Czerwiński et al., 2018; Kołacz, 2023). A major problem in agricultural management is the production of large quantities of liquid and solid animal excreta and production waste (dead animals, stillborn animals), which requires safe management. Intensive fertilization and improper storage of manure contribute to greenhouse-gas emissions, including CO_2, CH_4 and N_2O, environmental acidification due to ammonia (NH_3) emissions, eutrophication of surface waters and contamination of groundwater through phosphorus and nitrogen leaching and surface runoff from fields. Air pollution (odours, ammonia, hydrogen sulphide, organic dust and microbial and parasitological contamination), as well as soil and surface-water pollution, are important problems (Limoli et al., 2016; Sosulski et al., 2016). The significant environmental impact of intensive animal production requires an integrated permit when such production is started or operated, in accordance with Directive 96/61/EC of 24 September 1996, the Polish Environmental Protection Law of 27 April 2001 and national implementing regulations. From the viewpoint of environmental protection and human and animal welfare, intensive production with animals kept without bedding on slatted floors is unfavourable (Maes et al., 2020; Roy et al., 2023), unlike deep-litter or free-range systems, which are more friendly to the environment, animals and people, although they are not without disadvantages (Park et al., 2017; Pietrosemoli and Tang, 2020). Implementing best management practices and an appropriate, friendly attitude of stockpeople towards animals makes it possible to establish and maintain animal health and welfare while achieving production-profitability and environmental-protection goals (Sońta et al., 2024). In the extensive model, daily emission of harmful ammonia is almost 2.5 times lower than in the intensive model (Augustyńska-Prejsnar et al., 2018), which argues in its favour.

In intensive production, animal excreta such as manure and slurry may contain glyphosate. Its source is plant-protection products (pesticides) used in crop production, including genetically modified crops intended for animal feed. Opinions on the effects of glyphosate on the environment, animals and humans are divided (Sørensen et al., 2021; Sutherland et al., 2021; Birge et al., 2024). Feeding pigs diets containing glyphosate, including feed from genetically modified crops, is generally considered not to significantly affect meat quality or animal health. It has not been shown to have harmful effects on growth and health, carcass traits or meat quality. Concerns have nevertheless been raised regarding glyphosate residues in food, although effects on meat products have been assessed as minimal. Metabolism studies using high glyphosate doses in feed (up to 400 mg/kg) were used to establish the tolerance for glyphosate in meat (muscle), which is 0.05 mg/kg (FAO, 2005). Using an appropriate model, Sutherland et al. (2021) confirmed that the relationship between genetically modified herbicide-resistant crops and glyphosate use is a driver of increased soil-carbon sequestration. Elimination of tillage and adoption of minimal soil disturbance reduced the amount of carbon released from cultivation and increased carbon sequestration through continuous plant production. According to Canadian data, countries that prohibit genetically modified crops and introduce regulations restricting glyphosate use may implement policies that do not increase agricultural sustainability. Literature on potential effects of glyphosate on livestock is scarce and concerns mainly in vitro studies (Sørensen et al., 2021). In the opinion of the cited authors, definitive conclusions require in-depth in vivo studies involving farm animals at different physiological and production stages, particularly animals sensitive to disturbances in mineral metabolism and gut microbiota.

Public perception tends to apply a uniform assessment of the environmental effects of animal production, including pork production, to all husbandry methods. In fact, free-range/pasture production and extensive pig production on deep litter, in both conventional and

organic models, because of their smaller scale and lack of production concentration, do not exert such far-reaching adverse effects on the natural environment, which is beneficial from the perspective of human well-being (Horsted et al., 2012; Rudolph et al., 2018). Other aspects of animal production are also environmentally harmful, including deforestation (Dreoni et al., 2022), the environmental costs of monocultures of genetically modified soybean and maize in South America, and excessive anthropocentrism (da Silva and de Majo, 2023). Soybean and maize are imported into the EU for animal feed, including pig feed; pork production accounts for 75% of imports (Raman, 2017; Noack et al., 2024). The use of imported genetically modified soybean and maize in intensive production breaks trophic chains and disrupts natural ecosystems in the areas where feed crops are grown.

Mental health – selected issues

The welfare of farm animals, including pigs, has a direct effect on the mental well-being of people who fulfil various social roles in relation to them. The role of the farmer or farm employee and that of the veterinarian appear to be the most visible and capable of providing direct gratification. Equally important, and in fact determining the direction of development of the pork sector, is the role of the consumer. Consumers may derive satisfaction from knowing that their choices support high-welfare animal keeping in which pigs can express natural behavioural needs. The role of politicians and officials involved in shaping animal-welfare and animal-production legislation and supervising its enforcement should also not be overlooked. An ethical approach to farm animals builds, regardless of a person's role in relation to the animal, a sense of satisfaction and of a duty properly fulfilled – a duty humans assumed through the domestication of the wild pig thousands of years ago. Genuine concern for dignified living conditions of the pig, an intelligent and sensitive creature, and of other farm animals, may give farming a new status (Mroczkowski et al., 2011).

Improved pig welfare means a better working environment and better well-being for the farmer. Pol et al. (2021) conducted a survey of employees on 52 farrow-to-finish pig farms in France. They combined questionnaire results with direct observation of the production environment, a human approach test and an analysis of productivity. They examined the effect of the human–animal relationship on animal welfare and on human working conditions (Pol et al., 2021). They showed that the farmer's personality directly affects animal welfare and production productivity. Better results were recorded among farmers for whom animals were the most important element of their profession, who enjoyed farm work and showed empathy towards animals. A study carried out in 2017–2019 among Norwegian farmers, including 125 pig farmers, analysed the relationship between farmer health, animal welfare and production results (Torske et al., 2024). The researchers found positive correlations between animal-welfare levels and good human well-being and low stress. Like the British Farm Animal Welfare Council (FAWC), they identified farmer welfare as one indicator of animal welfare.

Albernaz-Gonçalves et al. (2021) studied 44 Brazilian farmers to assess their awareness of their influence on the welfare of pigs kept intensively without bedding and their knowledge of behavioural disorders in animals. A range of stressful and painful practices were identified, together with a housing environment that adversely modified animal behaviour. Although farmers were able to recognize various aspects of welfare, under the influence of social realities and industry requirements they perceived their role as limited to providing animals with minimum biological conditions. They did not link pig health with the lack of opportunities for pigs to fulfil behavioural needs. In dealing with the consequences of reduced welfare they relied mainly on veterinary measures, including antibiotics. A commonly reported problem was a lack of a sense of belonging to the production chain. The study found that the intensive production model limits farmers' autonomy and their ability to fulfil the role of welfare guardians. The

authors suggested that a positive change could come from returning to an integrated consideration of the interests of people, animals and the environment (Albernaz-Gonçalves et al., 2021).

Steen (2024) studied farmer health and well-being and the relationships between farmers' health and well-being and the health, welfare and productivity of their livestock. Poor farmer well-being – including symptoms of anxiety, depression, psychological distress or low life satisfaction – was associated with poorer relative overall scores of animal health and welfare on the farm. The results analysed and assessed were subsequently obtained from observations of cattle, sheep and pigs at slaughterhouse level. Significant relationships between farmer health and welfare and animal health and welfare were confirmed. This has potential implications for the sustainability of agricultural work and for the ethical and environmental sustainability of animal-based agriculture. According to Steen (2024), there is a need for longer-term studies of farmers and their farms. Such knowledge is essential for evidence-based policy concerning ethical, sustainable and safe food production.

Social and economic benefits

In addition to supplying an appropriate quantity and quality of food (production function and food security), agriculture also performs important social, cultural and ecological functions (Groenfeldt, 2006). It provides jobs, maintains the vitality of rural areas, and sustains rural cultural tradition and identity. Intensification of agriculture, including animal production, and vertical concentration of production chains, such as the pork chain, deprive agriculture of significance in the social, cultural and ecological spheres. By creating dependence on long supply chains, this process limits food sovereignty and removes the profession of the individual farmer from the labour market, which is reflected in recent changes in the structure of farms in Poland (Wojewodzic et al., 2023).

The European Parliament implementation report of 16 February 2022 on on-farm animal welfare (European Parliament Resolution, 2022) drew attention to the demographic situation in European agriculture, describing it as alarming. The lack of generational renewal on livestock farms may adversely affect implementation of animal-welfare standards. The report stated that investment in the attractiveness of the farming profession is necessary. This should increase the motivation and productivity of current and future livestock farmers. Implementing these recommendations calls into question the rationale for further intensification of animal production where the basic assumption is to increase output while reducing costs and labour inputs (Baum, 2012; Baum et al., 2013), rather than prioritizing animal welfare and the welfare of the individual farmer.

From an economic perspective, it should be noted that production intensification is accompanied by specialization and vertical concentration of the pork production chain – from companies specializing in genetic improvement, supplying piglets and producing feed, through producers responsible for fattening, processors and distributors, to retail chains (Baum, 2012). This is visible in the changing production structure towards large-scale agricultural enterprises. Small farms often cannot find a place in this system. The system is based on minimizing costs, reducing human labour and automating production, and thus on further separating animals from human contact. Scientific studies of pig behaviour indicate that a functional relationship with humans is a key factor in ensuring pig welfare (Kaleta, 2005; Mroczkowski et al., 2011; Mellor, 2016; Albernaz-Gonçalves et al., 2021; Hayes et al., 2021; Pol et al., 2021; Kołacz, 2023; Torske et al., 2024). Under intensive conditions, human contact is limited in duration and personnel, and precision-livestock technologies may weaken contact still further, to the detriment of animals (Sadeghi et al., 2023). It appears necessary and ethically justified to ensure

housing conditions and human contact such that domestication is understood not as enslavement and domination but as a kind of contract between humans and animals (Kaleta, 2005).

One aspect of maintaining and promoting extensive animal production on family farms is the use of such farms as care farms. This form is not yet popular in Poland but is fairly common in many Western European countries. The idea of care farms is to use the farm structure and agricultural activity to provide care services for people requiring support, such as seniors, people living alone and people with disabilities, and to support social integration (GROWID, 2022). According to an individualized activity plan, visitors perform light work or simply spend time in the natural environment and with animals (agrotherapy and animal-assisted therapy). Observations of such farms in Western European countries show that contact with animals and nature improved the physical and mental condition of programme participants. Poland does not yet have legal regulations for this type of farm, although the Ministry of Agriculture and Rural Development began implementing the programme in 2019.

A driver of change may be increasing consumer demand for high-quality pork produced according to the highest welfare standards. High-welfare farms have a low investment coefficient owing to the use of extensive-housing elements such as pasture, huts, shelters, outdoor runs and traditional farm buildings. Extensive housing conditions can also increase production quantitatively because they (i) make use of the animals' full biological potential, (ii) eliminate stereotypies, technopathies and diseases caused by the housing environment, and (iii) produce pork with better technological parameters, shelf life, dietary and sensory qualities, while making it possible to obtain a higher price for the final product (Blokhuis et al., 2010; Baum et al., 2013; Klink-Lehmann et al., 2023).

Final remarks

Animal welfare is a category that has been extensively studied and described, including in relation to the domestic pig. It is inseparably linked with humane treatment of animals by people and with genuinely ensuring that they can express natural behavioural needs within at least a "life worth living".

Analysis of welfare and behavioural modification in domestic pigs under different housing conditions provides grounds for concluding that animal welfare and broadly understood human well-being are closely interdependent. An overly narrow understanding of animal welfare, which treats biological criteria and production efficiency as the primary criterion, negatively affects human well-being. In order to meet animal-welfare requirements provided for by law in a genuine way, the pork production chain needs to be organized in accordance with the behavioural needs of the species. Indicators of efficiency other than economic ones, such as pig welfare and length of herd use, should be taken into account, as should preservation of the profession of the individual farmer. Giving unquestionably important and necessary economic considerations priority over other components of human well-being, such as health and care for the natural environment, is not fully rationally justified. Different production methods, in which housing and feeding models other than intensive systems are or may be used, have direct beneficial effects on both animal and human health. It should be emphasized that a change in social awareness is still necessary in this area. A real lever of market pressure is education concerning food quality, including pork quality, and consumer demand for change.

Summary

The human–animal relationship modulates animal welfare, including health, productivity and product quality. Understanding and managing human attitudes in order to reduce animal stress not only makes it possible to increase farm productivity but also improves employee well-being. Consumer awareness of the effect of food quality on human health is increasing. Concern for the health of the human population may contribute to better treatment of animals kept for food production because consumer health benefits outweigh ethical and environmental motivations. Intensive animal production places pressure on all resources of the natural environment, biodiversity, climate and people. Extensive farming may be an alternative method that meets the needs and expectations of consumers who, for ethical and environmental reasons, critically assess intensive production methods. Farm-animal welfare directly affects the mental well-being of people who fulfil various social roles in relation to animals. Increased animal welfare means a better working environment and improved well-being for farmers. Studies of farmer health and well-being and relationships between farmer health and well-being and the health, welfare and productivity of their livestock have shown that poor farmer well-being, including anxiety symptoms, depression, psychological distress or low life satisfaction, was associated with poorer animal health and welfare on the farm.

In addition to its production function, including ensuring food security, agriculture also performs important social, cultural and ecological functions; hence the need to invest in the attractiveness of the farming profession. This should help increase the motivation and productivity of current and future livestock farmers. However, while providing animals with necessary and ethically appropriate housing conditions, it is also justified to maintain proper, regular contact between humans and animals.

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MUTUAL RELATIONSHIPS BETWEEN HUMANS AND ANIMALS IN TERMS OF THEIR WELFARE

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SUMMARY

The aim of this study was to present selected relationships between humans and animals in terms of their welfare. The human-animal relationship is reciprocal and symmetrical, and the interdependencies between them should be considered in terms of physical and mental health as well as social, environmental, and economic benefits. Comprehensively studied animal

welfare is closely related to their humane treatment by humans and ensuring the possibility of expressing natural behavioral needs within the framework of at least a “life worth living”. The “Five Freedoms” model has set international standards for assessing the welfare of farm animals. An overly narrow understanding of animal welfare, which considers biological criteria and production efficiency to be fundamental, negatively affects human welfare through continuous stressors. Models of animal husbandry and feeding that differ from intensive ones have a beneficial effect on both animal and human health. Extensive farming in conditions of increased welfare can be an alternative method that meets the needs of consumers who, for ethical and environmental reasons, are critical of intensive production methods.

Keywords: human-animal relations, animal and human welfare