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Chapter 5

Positive welfare: what does it add to the debate over pig welfare?

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Abstract

Since the beginning of the farm animal welfare debate half a century ago, the focus has been on the negative side of animal welfare, with most research studying the harms induced by modern husbandry to animals and how to prevent them. Here we review the trend to investigate what has become referred to as positive animal welfare. We review the main published papers on positive welfare and distill the commonalities and distinctions made in the different approaches to positive welfare. Next, we describe several animal-based approaches for assessing positive welfare in pigs and the limited data available on the current status of positive welfare in modern pig production. Finally, areas are identified where a focus on positive welfare could set future trends in animal welfare research and implementation of better pig welfare on farms.

Keywords. Positive animal welfare, quality of life, pigs, literature review, animal-based assessments, benefits of positive welfare

[Chapter starts here]

5.1 Introduction

Pigs have always been a key species in debates over farm animal welfare. Pigs featured prominently in *Animal Machines* (Harrison, 1964) that famously presented a lay account of the farm animal welfare issues that emerged in the second half of the 20th century. Pigs were given their own section in ‘The Brambell Report’ (Brambell, 1965) which followed as a response to the public concern raised by Harrison’s book in the United Kingdom. Brambell (1965) objected to multiple features of intensive pig production including the use of fully slatted floors, high stocking densities, poor air quality, use of tail docking to control tail-biting and close confinement of sows. Many of these concerns remain today (Chapter 1; Lawrence and Vigors, 2020).

For domestic pigs, much of the ‘wild-type’ or ‘natural’ behaviour remains despite the process of domestication (Chapter 1; Stolba and Wood-Gush, 1989) and there is growing evidence of their cognitive and affective abilities (see Chapter 4 on cognition and affective states). Yet, most modern pig production systems remain highly constraining with respect to pigs’ behavioural and psychological capacities (Chapter 1; Chapter 4). There is still pressure for agriculture to further intensify, albeit ‘sustainably’, given the combination of land-use constraints and concerns over environmental degradation, climate change and food security (e.g., Garnett et al., 2013; Rauw et

al., 2020). The trend for increasing intensification of pig production with concomitant and long-standing concerns over pig welfare form part of the backdrop to this chapter. However, our main aim is to address the development of what we refer to as ‘positive welfare’. We describe the development of this relatively recent concept, and its implications for pig welfare including what positive welfare may add to the debate over pig welfare in intensive production systems. We also identify parallel and potentially influential developments in understanding positive aspects of quality of life (henceforth QoL) in the life sciences more generally.

5.2 Origins of ‘positive animal welfare’

There are antecedents of the ‘positive animal welfare’ concept to be found in the work of 18th and 19th century moral philosophers such as Mill and Bentham (e.g., Acton, 1961), and more recently from the early days of modern animal welfare science (e.g., Fraser and Duncan, 1998). Scientific interest in ‘positive welfare’ initially gained momentum through the review papers of Boissy et al. (2007) and Yeates and Main (2008). Subsequently, the UK Farm Animal Welfare Council (FAWC) presented an influential report on the future of farm animal welfare (FAWC, 2009), with a framework for improving the QoL of farmed livestock. Although the report did not refer to positive welfare specifically, it was clearly influenced by the developing scientific interest in positive welfare. Since these initial writings, there has been continuing review and development of the positive welfare concept (e.g. Lawrence et al., 2019; Rault et al., 2020). The inclusion of positive animal-based welfare measures such as a positive human–animal relationship among the proposed guiding principles for WOAHA animal welfare standards (World Organisation for Animal Health, formerly OIE, 2016), reflects that positive welfare is now an active topic of discussion on the world stage. In addressing why the animal welfare science

community began writing about positive welfare, we consider here the assumptions or premises that underpin interest in the concept.

5.2.1 Premise 1: Since the start of the modern animal welfare debate (post 1960s), the focus has been mainly on negative aspects of welfare.

There are clear statements relating to this premise in the following: “*The vast majority of concern for animal welfare appears to be centred upon negative concepts*” (Yeates and Main, 2008); and “*Animal welfare is usually considered primarily in terms of the animal’s negative experiences*” (Phillips 2008). Furthermore, the Five Freedoms framework, often regarded as the most influential for animal welfare, has been found wanting with respect to positive welfare:

“One criticism of the Five Freedoms is their focus on poor welfare and suffering. This focus was undoubtedly appropriate at the time they were devised but the requirement to provide for an animal’s needs in the new Animal Welfare Acts implies that good welfare should be an ambition too” (FAWC 2009). This was also emphasized by Mellor (2016a): “*Notwithstanding its widely beneficial influence, the Five Freedoms paradigm has...sought to focus attention on the negative experiences and states that were understood to contribute to welfare problems of serious concern at the time*”. Furthermore, although the 'Freedom to express normal behaviour' provides a positive note relative to the other four freedoms, it does not explicitly value positive experience (but see McCulloch (2013) for a defence of the Five Freedoms). A focus on the negatives has also been the case in other areas of life sciences including the study of human psychology (King and Landau, 2003). For example, Myers and Diener (1995) noted that human literature on negative states exceeded that on positive states by a ratio of 17 to 1.

We have previously provided evidence of negative terms predominating in pig welfare research, with a focus on 'stress', 'slaughter' and 'meat quality' and little evidence of positive terms with the exception of 'enrichment' (Lawrence et al., 2018; Freire and Nicol (2019) came to similar conclusions with their bibliometric study of animal welfare science). In support of Premise 1, we have updated our previous analysis (**Fig 5.1**). There is clearly a substantial increase in research on 'Precision Livestock Farming' (PLF), 'automated detection' of welfare traits and use of 'machine learning' to decode data from cameras and other sensors. Otherwise there remains an emphasis on negative aspects of welfare (e.g., 'stress', 'tail-biting', 'slaughter'). Besides 'enrichment', there is no reference to positive terms; furthermore, many of the papers on enrichment are aimed at reducing damaging behaviours such as tail-biting (e.g. Lahrman et al., 2018; Haigh et al., 2019) as opposed to directly facilitating positive welfare.

[note to publisher: insert around here fig 5.1]

Figure 5.1 A word cloud produced from a literature search of pig welfare papers (using Web of Science and the search term 'pig welfare'). Papers were taken from 2018-2022 and the words that best described the aims of the paper (taken from the title, abstract and key words) were compiled and put through a word cloud generator (<https://www.freewordcloudgenerator.com/generatwordcloud>). Given the substantial numbers of papers captured for the period 2018-2022 (>700) we randomly selected papers (n=35 for each year apart from 2022 (n=10)).

5.2.2 Premise 2: There is increasing scientific acceptance of animals having the capacity for experiencing positive emotions and, more broadly, positive feeling states (or affects).

The wider acceptance of positive affective states in animals is supported by research in a range of disciplines including neuroscience and the behavioural sciences (see Boissy et al., 2007; Burgdorf and Panksepp, 2006; Mellor, 2015a; Kremer et al., 2020 for reviews; Lawrence et al., 2018 also provide direct quotes in support of Premise 2). Detailed analysis of the assumption that animals are capable of experiencing sensations and emotions in some way analogous to humans reveals the complexity of interpreting the underlying evidence (e.g., Mendl and Paul, 2004; Dawkins, 2017). As discussed in detail by Paul et al. (2020), the question of whether animals experience the subjective or conscious components of emotional states remains controversial (although see Wemelsfelder, 2007, for an alternative perspective). Nonetheless, despite the philosophical challenges and complexity of the science, the concept of animal sentience has become enshrined in law both in the EU (e.g., Bennett and Blaney, 2002) and in some individual countries (e.g., Czechia). Further developments can be expected here; for example, in the United Kingdom, legislation has been passed to create an Animal Sentience Committee with the aim of reviewing government policy for its impacts on sentient animals (UK Parliament, 2022; <https://bills.parliament.uk/bills/2867>). The recent trend within the scientific community towards acceptance of positive affect in animals as a topic worthy of research may therefore be seen as a continuation of the development of animal welfare concerns and the acceptance of animal sentience that has emerged since the 1960s (e.g., Woods, 2012; Lawrence and Vigors, 2020). There has been significant progress in recent decades in our understanding of the origins of affective states and their relevance to welfare. Three main types of valenced affective states can be distinguished. A first category consists of homeostasis-related affects (Denton et al., 2009) such as pain (Chapter 2), thirst (Denton et al., 1999) hunger (Chapter 7), nausea, satiation and thermal comfort. A second class comprises ‘emotional affects’ (or emotions in short) arising from

the limbic system (Panksepp, 2011) including fear (Boissy, 1995), curiosity/seeking (Špinka and Wemelsfelder, 2011), anger/rage/frustration (Panksepp and Zellner, 2004), sexual attraction, parental nurturance and joy/having fun (Špinka et al., 2001). Moods, such as anxiety, depression, apathy, boredom, or self-confidence make up a third class of affective states. Moods are not, in contrast to emotions, specific reactions to a particular ongoing situation but rather arise through an accumulation of short-term emotional experiences (Kremer et al., 2020). Thus, moods are longer lasting, “free-floating” affective states (Mendl et al., 2010; Webb et al., 2018). All classes of affective states involve subcortical processes and may be modified by learning or regulated by cortical cognitive processes, although neuroscientists disagree whether subcortical activity alone is sufficient to generate affective experiential states (Denton et al., 2009; Panksepp et al., 2017). Functionally, homeostasis-related affects handle the animal’s behavioural responses to already occurring challenges and to damage in bodily functioning that immediately endangers physical fitness or survival. These affects are mostly negatively valenced, although opposing mechanisms produce states such as ‘contentment’ after consumption of tasty food or thermal comfort, that can be affectively positive (Berridge, 2000). Emotions and moods, in contrast, both motivate behaviour and potentially guide the animal in choosing behavioural strategies that facilitate longer-term survival and reproduction by avoiding potential threats (Stankowich and Blumstein, 2005; Trimmer et al., 2008) and discovering opportunities relevant to its individual development (Renner, 1988; Fraser and Duncan, 1998; Freund et al., 2015). Thus, emotional affects can be negatively (fear/anxiety, rage/anger, panic/grief) or positively (lust, joy, curiosity, caring) valenced and the same is true for negative moods such as pessimism, anxiety, depression-like states, or boredom (Fureix and Meagher, 2015; Burn, 2017; Meagher, 2019) and positive moods

such as optimism, sense of control, sense of security or sense of competence (Mendl et al., 2010; Špinka and Wemelsfelder, 2011).

Appreciation of the importance of affective states is important in the human positive psychology literature (Seligman and Csikszentmihalyi, 2000; Fredrickson, 2003; Alexander et al., 2021) and in the concept of QoL as applied, for instance, in human medicine (Musschenga, 1997). During the last two decades, these notions have spilled over into the area of animal welfare (McMillan, 2000; Špinka and Wemelsfelder, 2011), with the idea that positive affective states arise when animals are in a good immediate state (homeostasis-related affects), when they undertake rewarding goal-directed behaviours (emotions: Hagen and Broom, 2004; McGowan et al., 2014; Mellor, 2015b; McCoy et al., 2019; Reinhold et al., 2019) and when they are generally successful or satisfied (moods: Mendl et al., 2010; Špinka and Wemelsfelder, 2011; Kremer et al., 2020).

5.2.3 Premise 3: there are potentially 'wider'/'hidden' benefits associated with or causally related to positive welfare.

The concept of animal welfare has always encompassed both physical and mental health. For example, the Five Freedoms cover freedom from pain, fear, injury and disease (FAWC, 2009). Good welfare has been viewed as a state in which an animal is 'fit and happy' (Webster, 2005) and Dawkins (2008) suggests that animal welfare can be defined in terms of whether animals are 'healthy' and 'have what they want'. More recently the idea that positive feelings may promote health and possibly also productivity in farm animals, has created increased interest in seeking wider benefits of positive welfare and has encouraged investigation into how improvements to animal welfare can be of benefit to humans as well as animals (e.g., Christensen et al., 2012;

Dawkins, 2012; Dawkins, 2016). The possibility that positive animal welfare may have physical health benefits emerges in part from the human literature where certain associations between positive affect and physical health have been reported (e.g., Cohen and Pressman, 2006; Pressman et al., 2018; Steptoe, 2019), although causality remains a topic of ongoing debate (e.g., Friedman and Kern, 2014). Similarly, an association between positive affect and longevity has been claimed for primates (e.g., Weiss et al., 2011) and there is evidence from rodents to support links between positive affect, enhanced synaptic plasticity and resilience to depression (Crofton et al., 2015; Burgdorf et al., 2017). The new field of affective immunology is prompting investigations into mechanisms linking positive affect with disease resistance and resilience (D'Acquisito, 2017; Döpjan and Dawkins, 2022), and studies on 'psychobiotics' (Lee et al., 2020) raise the possibility of altering the microbiome through inoculation with 'good bacteria' to boost positive welfare.

5.2.4 Premise 4: there is a need for re-defining animal welfare to encompass positive welfare and push forward the debate over animal welfare.

It follows from Premises 1 to 3 that there has been a developing impetus behind extending current animal welfare frameworks to better encompass positive welfare. The review of McMillan (2000) is, to our knowledge, the first systematic transfer of the QoL concept from humans to nonhuman animals. Although not using the term positive welfare, McMillan (2000) discusses QoL as a multidimensional experiential continuum in which 'better QoL refers to preponderance of pleasant rather than unpleasant affect in one's life over time'. Thus, he focuses on the hedonic (pleasure) aspect of QoL, although the QoL concept used in human medicine also

identifies needs satisfaction, health, control, social relationships and (absence of) stress as elements of QoL.

In addition to covering the assessment of positive welfare, Yeates and Main (2008) suggest that approaches to facilitating positive welfare could be based on concepts of 'human happiness' (e.g., Seligman et al., 2005). Based on human studies, the authors propose that animals should have a pleasurable life, an engaged life and a meaningful life. In attempting to link these human-based concepts to animals, the authors provide examples of positive and negative outcomes associated with the animal equivalents of pleasures, environmental engagement and realisation of goals. The latter points towards the concept of eudaimonia in human positive psychology (i.e., having a sense of purpose in life and fulfilling one's potential).

FAWC (2009) presents a vision based on a QoL conception with three levels: 'a life not worth living', 'a life worth living' and 'a good life'. In a similar vein to Yeates and Main (2008), FAWC suggests that future thinking on-farm animal welfare should move beyond conventional incremental improvements and consider more dramatic improvements in order to ensure a life worth living for every farm animal and a good life for a growing number of farm animals. It proposes enhancing welfare through increasing opportunities for 'comfort', 'pleasure', 'interest' and 'confidence'. There is no explanation in the report for the origin of these four 'good life' opportunities.

The 'effectiveness' theory of human motivation (Higgins, 2011) posits that people are motivated to be effective in achieving desirable outcomes ('value effectiveness'), in establishing what is real ('truth effectiveness') and in managing what happens ('control effectiveness'). According to Franks and Higgins (2012), both human well-being and animal welfare are highest when all three effectiveness processes work together, thus creating an 'organisational effectiveness'. Thus, good

QoL for an animal results from a combination of effective biological, behavioural and psychological (i.e., cognitive and affective) functioning.

Edgar et al. (2013) combine a study of positive welfare in laying hens with the introduction of a Resource Tier approach, analogous to the animal welfare tiers approach used in various marketing schemes (e.g., <https://beterleven.dierenbescherming.nl/english/>). They build on the FAWC (2009) report by discussing animal welfare in relation to the four 'good life' opportunities, while adding 'Healthy Life' to achieve a balance between animals being healthy and 'having what they want' (Dawkins, 2008). Based on literature and expert opinion, a relative ranking was made to create three tiers of increasing welfare ('good life' levels: welfare+, welfare++, welfare+++) for each of their five good life opportunities ('comfort', 'pleasure', 'interest', 'confidence' and 'healthy life'). The authors propose 13 generic principles within the five 'good life' opportunities which they argue could be applied to all types of farm animals, such as the ability to exercise individual preferences for food ('pleasure') and thermal environment ('comfort') or to have positive experiences with people and social group members ('confidence').

Mellor (2016a) presents one of a series of reviews on positive welfare (Mellor, 2015b, 2016b) and acts as a bridge to other frameworks including the one used to create the Welfare Quality® principles (e.g., Blokhuis et al., 2010). The main features of Mellor's approach are that: (1) it focuses on provisions to support good welfare; (2) the provisions include the four Welfare Quality® principles of 'Good nutrition'; 'Good environment'; 'Good health'; 'Appropriate behaviour' to which a fifth, 'Positive mental experiences', is added; (3) it aligns the provisions with welfare aims to minimise negative and maximise positive experiences; (4) the exception to this is the fifth provision which is directed solely at promotion of the positive experiences of

‘comfort, pleasure, interest, confidence and a sense of control’; and (5) it emphasises the importance of promoting engagement in behaviours that are rewarding through active interactions with the environment (Mellor, 2015a, 2015b).

Webb et al. (2018) extends the work of McMillan (2000), Frank and Higgins (2012) and Yeates and Main (2008) by using the human and animal literature to delineate a concept of animal happiness. Webb et al., (2018) conclude that animal happiness is most likely solely based on the animals’ affective state which differs from humans where both affective and cognitive components contribute to happiness. They define animal happiness as how the animal feels ‘most of the time’, that is the balance of positive and negative affect, and see happiness as a long-term stable trait as distinct from emotions and moods which are shorter-term and variable.

When reviewing the literature, Lawrence et al. (2019) found only a small core literature on positive animal welfare. The positive welfare literature was defined by four features: (i) positive emotions; (ii) positive affective engagement; (iii) Quality of Life; and (iv) happiness. The first two features can be seen as continuous with existing animal welfare research, whilst the latter two are less developed in the animal literature and raise new challenges including how to aggregate different aspects of positive welfare and the need to consider welfare in the longer-term. The review also interprets these main features of positive welfare within the context of the wider literature (see Figure 1 in Lawrence et al., 2019).

Turner’s (2019) review applies the concept of positive welfare to animals used in biomedical research, discussing the development of the positive welfare concept, its ethical implications for laboratory animals and the measurement of positive welfare. Interestingly, the paper emphasizes the need to consider more than the affective state of the animal when considering the animals’

welfare state, arguing for the inclusion of good physical health and the satisfaction of most essential needs.

Rault et al. (2020) describe 'hedonic positive welfare' (arising from the animals' likes and wants) and 'positive welfare balance' (the animals' overall positive welfare state) as two distinct perspectives in the positive welfare literature. They also suggest that 'satisfaction with ones' life' may emerge as a third view. They propose the 'Vienna Framework' in which any feature contributing to positive welfare (e.g., social play or free range housing) is seen as composed of a common set of facets (namely: frequency, duration, arousal, context, previous experience, individual differences, sense of agency, and long-term benefit). The framework aims at providing a common structure for comparing different topics in positive welfare or for assessing the impacts of various interventions such as environmental enrichment.

In a paper examining scientific and societal perspectives on animal welfare Vigors et al. (2021) suggest that society (farmers and members of the public) sees minimising or eliminating negative aspects of welfare such as poor health as integral to, or even, sufficient for, positive welfare and would prioritise welfare needs according to the animals' specific situation (e.g., confined versus free-range). They found that citizens did not emphasise the animal's whole life whereas scientists are pursuing this view. They identified a need to account for both negative and positive aspects of welfare, to prioritise these depending on the context and to consider the balance of negative and positive aspects over an animal's lifetime.

Building on the Resource Tier approach (Edgar et al., 2013), Rowe and Mullan (2022) developed 'Good Life Frameworks' for pigs as well as beef cattle and broiler chickens, describing the resources that could progressively increase good life opportunities in these species. This study

gives some indication of the extent to which producers are providing enhanced welfare conditions for their animals.

In summary, these approaches to positive welfare have important commonalities and distinctions, which we further elaborate on below:

The influence of human literature on positive welfare

Yeates and Main (2008) and Franks and Higgins (2012) base their positive welfare framework partly on the work of Seligman and colleagues from the field of positive psychology (e.g., Seligman et al., 2005; Seligman and Csikszentmihalyi, 2000). FAWC (2009) do not indicate the origin of their ‘good life opportunities’ (comfort, pleasure, interest, confidence) but these terms are found in the positive psychology literature (e.g., Scorsolini-Comin et al., 2009) suggesting that positive psychology had some influence on their use by FAWC. Edgar et al. (2013) adopted these terms for their Resource Tier approach. McMillan (2000), FAWC (2009), Edgar et al. (2013), Mellor (2016a,b) and Webb et al., (2018) draw from the QoL concepts developed in human medicine and sociology (Musschenga, 1997), albeit from different perspectives. While McMillan (2000) stresses the multidimensional character of QoL, FAWC (2009), Edgar et al. (2013), Mellor (2016b) and Rowe and Mullan (2022) propose a linear QoL scale with tiers of ascending animal welfare status, with the extremes being ‘a life not worth living’ vs ‘a good life’.

The relative importance of motivation and affect on positive welfare

The literature varies in the primacy of motivation and affect in relation to QoL. Yeates and Main (2008) draw upon the work of Berridge and colleagues (e.g., Berridge and Robinson, 2003) to make the distinction between what animals ‘want’ (motivation) and ‘like’ (affect). They admit

that wanting and liking usually go hand in hand but note that there are occasions when animals may perform motivated behaviours that deprive them of future pleasures or cause long-term harm. McMillan (2000) proposes that animal QoL is concerned exclusively with affect, while Franks and Higgins (2012) promote the primacy of motivation, of which affective experience is part, in their view. Mellor (2015b) discusses the integral connections between motivations and affects and argues for the importance of allowing animals to perform motivated behaviours in order to experience positive reinforcing affects.

The balance of needs and desires for positive welfare

The literature also varies as to the required balance for a good QoL, between more homeostatic-based 'needs' (or necessities) and 'other needs' that have also been termed wants, desires or opportunities. Although the terminology varies somewhat confusedly (needs vs wants (FAWC, 2009), needs vs desires (McMillan, 2000), survival-critical vs situation-related affects (Mellor, 2016a), harm-preventing vs positive-welfare-facilitating needs (Edgar et al., 2013)), the basic contrast remains the same and matches well with the above-described functional distinction between homeostasis-related and emotional affects. Yeates and Main (2008) quote a distinction between vital vs substitutable needs but they see both on a continuum of motivational strengths achieving different outcomes, with the possibility to assess the continuum on a sliding scale from 'completely inelastic' to 'elastic' based on consumer demand theory (e.g., Matthews and Ladewig, 1994). The literature varies as to the balance between 'needs' and 'desires' required for a good QoL. McMillan (2000), FAWC (2009) and Edgar et al. (2013) agree that meeting all homeostatic-based needs is essential for an 'acceptable' QoL or 'life worth living' (FAWC, 2009) and that fulfilment of all desires is not necessary for high QoL. FAWC (2009) specifies that a

'life worth living' requires provision of 'certain wants' while for a 'good life', provision of 'more wants' is needed. Turner (2019) and Vigors et al. (2021) see good physical health and meeting of homeostatic needs as essential to positive welfare. Yeates and Main (2008) and FAWC (2009) warn that meeting of some wants may be detrimental to the animal (Yeates and Main, 2008; FAWC, 2009) and Mellor (2016a) agrees that only harmless wants should be provided for. Franks and Higgins (2012) seem to put less value on needs satisfaction, suggesting that good welfare can be collected under the heading of effectiveness. For Franks and Higgins (2012), the ability of the animal to respond appropriately to challenges and opportunities is more important for its welfare than the absence of stress, disease and negative emotions or the presence of positive emotions per se. In spite of the differences, there is general agreement that desire fulfilment plays a constituent role in positive welfare, be it under the headings of 'control' and 'social relationships' (McMillan, 2000), 'engaged life' and 'meaningful life' (Yeates and Main, 2008), 'good life opportunities' (FAWC, 2009; Edgar et al., 2013; Rowe and Mullan, 2020), 'truth effectiveness' and 'control effectiveness' (Franks and Higgins, 2012), 'appropriate behaviour' (Mellor, 2016a) or 'hedonic positive welfare' (Rault et al., 2020).

Assessing positive welfare

Somewhat different solutions to assessing positive welfare are proposed. While there is general agreement that animal-based outcome measures provide the preferable direct assessment of positive welfare, they are often difficult to standardise and record, especially if the outcomes are behavioural or intended to assess mental states. Resource-based measures are more practicable and may be easier for farmers to accept (Edgar et al. (2013); Rowe and Mullan (2020)). Both Yeates and Main (2008) and FAWC (2009) promote combinations of resource-based and

outcome-based measures. Mellor (2016a) in his Five Domains model specifically proposes to measure two domains (Nutrition, Environment) through resources and three domains (Health, Behaviour, Mental State) as animal-based outcomes. Generally, we would suggest that resource-based criteria are practical proxy measures that ultimately require validation by outcome-based criteria.

5.3 Measuring positive welfare in pigs through behavioural indicators

Behavioural measures are the closest proxies to positive affective states and motivations that ultimately matter for the animal. Without attempting to be exhaustive, we describe six methods that fall into three categories: quantitative recording of spontaneously occurring behaviours (using play behaviour and affiliative social behaviour as exemplars), staged tests (preference testing, consumer demand and judgement bias) and qualitative behavioural assessment (QBA). For spontaneously occurring behaviours we refer to undisturbed behaviour in the ‘home pen’ or other living environments (i.e., not stimulated by test conditions). We cover play and social affiliation as two prominent behavioural patterns that appear to indicate that pigs feel good when they perform them, but also promote other facets of positive welfare and thus can be viewed as ‘beneficial wants’ and used as indicators of positive welfare. We refer to ‘wants’ in the same way as McMillan (2000) and FAWC (2009) to mean low priority or non-essential motivations; beneficial wants have few associated negative outcomes. See also Papageorgiou (2022) for a recent (non-peer) review of positive welfare indicators applied to pigs.

5.3.1 Play behaviour

Playing animals appear pleurably excited yet relaxed, giving the overall impression that they are having fun (Špinka et al., 2001). In pigs, movements that appear playful include hopping, scampering (bouncy running), pivoting (hopping around to face in a different direction), head tossing (sweeping the head from side to side), carrying objects in the mouth and shaking objects, leading Newberry et al. (1988) to use these behaviours as ‘markers’ of playful behavioural sequences (Fig. 5.2). Other behaviours such as butting and shoving are the main components of social play (e.g., Brown et al., 2015; Brown et al., 2018; Pellis and Pellis, 2016) but they also occur in the context of aggressive fights that result in bite wounds and their motivational basis can be ambiguous. Locomotor and social play frequently occur intermingled in pig play bouts, but they differ in ontogenetic trajectory, in their expression between sexes (Weller et al., 2019), in how much between-litter variance they display (Brown et al., 2018) and in how they co-vary with other types of behaviour including serious fighting (Turner et al., 2020; Cordoni et al., 2021; O’Malley et al., 2022). There are indications that locomotor play may be a more valid indicator of positive welfare than social play (Krugmann et al., 2020; Cordoni et al., 2021).

Note: Insert Fig. 5.2 around here.

Figure 5.2. Juvenile social interactions (A) are more clearly playful when occurring in sequences with “play markers” such as scampering (B) or shaking objects (C). Photos: Ruth Newberry, Marek Špinka.

At the psychological level, play could be conceived as reflecting an emotional state of elevated arousal and positive valence (see Mendl et al., 2010). At the neurobiological level, the feelings of joy accompanying mammalian play behaviour may be generated by a primary (i.e.,

unconditioned) emotional system of the brain that evolved specifically as the affective motivator of play (Panksepp, 2011). Opportunities for social play serve as rewards in T-maze, conditioned place preference and operant conditioning paradigms, at least for juvenile rats (e.g., Humphreys and Einon, 1981; Calcagnetti and Schechter, 1992; Achterberg et al., 2016) demonstrating that animals are motivated to play. Based on the interpretation that play is motivated behaviour associated with positive feelings and occurs when there is an absence of threats to fitness, it was identified by Boissy et al. (2007) as one of the most promising indicators for assessing positive welfare (see also Lawrence, 1987).

Held and Špinková (2011) identified four aspects through which performance of play by animals can indicate their positive welfare. First, play indicates a favourable environment because animals tend to reduce play when they are experiencing challenges and even abolish play when their fitness is under serious threat. Second, play indicates the presence of neurotransmitter-mediated pleasurable affective experience. Third, play may contribute to the animal's bodily, cognitive and affective competence and resilience, thus improving chances for positive welfare in the future. Finally, because of its contagious nature, play could be an indicator of good social functioning in group housed animals. In pigs, the first point is illustrated by brief suppression of play in bad weather (Newberry et al., 1988), after abrupt separation of piglets from the sow at weaning (Donaldson et al., 2002; Martin et al., 2015), and after adult alarm barks (Chan et al., 2011). Across studies, pigs have been reported to play more when the environment is enriched with straw or other materials (Haskell et al., 1996; Chaloupková et al., 2007; Bolhuis et al., 2005), has less ammonia (Parker et al., 2010), and when the mother is not confined in a farrowing crate (Martin et al., 2015; Singh et al., 2017). In addition, piglets remaining with their own mother engaged in more social play than fostered piglets (Martin et al., 2015). In summary,

the evidence indicates that if two or more living environments of pigs are compared, the amount of spontaneous play can serve as an indicator of positive welfare differences between them.

The ubiquitousness of play in young mammals implies evolved short-term and/or long-term functional benefits (Špinka et al., 2001; Held and Špinka, 2011) but evidence is so far patchy for domestic pigs. One hint of a potential benefit in pigs comes from the observation of a more rapid recovery of social play following weaning in pigs that had more social play experience prior to weaning, suggesting that the play experience may have enhanced their emotional resilience (Donaldson et al., 2002). More pre-weaning play was also associated with fewer or shorter post-mixing aggressive encounters (Martin et al., 2015; Chaloupková et al. 2007), although it was unclear whether these positive effects were specifically due to higher levels of play or to other aspects of a more complex pre-weaning environment. A positive relationship has been reported between individual play levels and growth rate (Brown et al., 2015; Franchi et al., 2023), but whether play can promote growth is uncertain. Gaining a clearer picture of the impact of play on fitness correlates remains a key topic for evaluating the validity of play as an indicator of positive welfare.

Given the indications that play behaviour may be a valid indicator of positive welfare in pigs, the question remains of how reliable a measure it could be. In other words, how strong is the 'signal' about positive welfare in proportion to the background 'noise' variability in play? The variability in recorded pig play levels is huge, whether it is quantified on individual, litter, or farm level (Brown et al., 2015; Šilerová et al., 2010). Brown et al. (2015) observed that 11% of the variance in play was attributable to within-litter differences between piglets. This was less than the variance attributable to differences between litters (50%), perhaps due in part to contagion of play among litter members. Pigs may differ in how much they initiate play and in how much they

tend towards solitary play (e.g., with an object) or social play (Zupan et al., 2019).

Interindividual differences in playfulness may also be related to other stable individual characteristics (O'Malley et al., 2019) such as coping styles (Bolhuis et al., 2005). The signal-to-noise ratio of play could thus be improved by accounting for factors that systematically affect levels of locomotory, social and object play, such as stable interindividual differences, age (e.g., Newberry and Wood-Gush, 1988) and sex (Rauw, 2013; Brown et al., 2015; Martin et al., 2015, Weller et al., 2019).

Variation in the methodology used to quantify play must be kept in mind when interpreting results across studies. Further, play behaviour takes up only a small proportion of the behavioural time budget, typically below one play interaction per hour and below 1% of time when recorded in a non-enriched home environment (Cordoni et al., 2021; O'Malley et al., 2022; Greenwood et al., 2019). Therefore, data collection on spontaneous play is time-consuming. However, play can be stimulated by releasing pigs from their home pen into a larger environment, especially if it is enriched by straw, food treats or novel objects (Wood-Gush and Vestergaard, 1991; Donaldson et al., 2002; Dudink et al., 2006; Reimert et al., 2013). Elevated play reported under test conditions may be interpreted to represent a 'relief' response to recent stress (e.g., rebound after weaning, handling or confinement), a coping response under conditions of mild anxiety (e.g., in the presence of a novel object), or an 'elation' response to the positive contrast of the stimulating play arena with a more monotonous home environment. While increased play under these conditions may mitigate stress, it is not necessarily reflective of positive welfare in the home pen. Nevertheless, regularly repeated stimulation of play may contribute to overall positive welfare (Lidfors et al., 2021). For example, twice daily addition of a small amount of rooting material in the home pen was found to be effective in stimulating play, and the play was

correlated with other signs of positive welfare in this context including exploration and curled and wagging tails, as well as a reduction in negative aspects of welfare including aggression and ear and tail manipulation (Ocepek et al., 2020).

To conclude, a better understanding of the variability, mechanisms, ontogeny and adaptive value of play in pigs is needed to assess its specificity and sensitivity as an indicator of positive welfare.

15.3.2 Social affiliative behaviour

Social behaviour has received a lot of attention in pigs but particularly in relation to negative outcomes such as tail-biting (chapter 12) and aggression (chapter 14). Affiliative behaviours, including allogrooming, have been proposed as potentially important contributors to positive emotional states in animals (Boissy et al., 2007). Allogrooming (gentle nibbling and licking) occurs to a limited extent in pigs (Camerlink et al., 2021). Social nosing (gentle nose contact with the head or body of another pig) appears to have different functions (e.g. social recognition, detection of food cues, alleviation of boredom) suggesting that it is not a pure indicator of (positive) affiliative behaviour. Nevertheless, social nosing appears to be an element of positive communication from the sow towards her piglets that has been related to maternal investment and motivation to care for offspring (e.g. Ocepek and Andersen, 2018; Rosvold et al., 2019), and it may be associated with positive physiological sequelae such as increased growth rate (Camerlink et al., 2012). It can also be directed towards humans when soliciting a pleasurable belly rub (Rault et al., 2019) or other friendly contact (Andersen et al., 2006). As with other potential indicators of positive welfare, the context in which the behaviour is performed needs to

be taken into account (e.g. a friendly social greeting or invitation versus a demand or mild threat), which may not always be easy to discern.

Social support or social buffering has also gained attention (Rault, 2012). There is some evidence that pigs can benefit from the presence of another familiar pig during a stressful event (Reimert et al., 2014) and that social buffering in piglets is associated with changes in gene expression in different brain regions (Kanitz et al., 2016). Rault (2016) illustrates a potential role for oxytocin in the maintenance of positive interactions between humans and pigs, allowing humans to function as sources of social support for pigs.

For positive welfare assessment, assaying which pigs chose to engage in activities together, such as rubbing and scratching, drinking water, sniffing a person or unusual object, sniffing and playfully butting each other, grunting in close succession, and resting together, provides evidence of pigs' affiliative relationships (Newberry and Wood-Gush, 1986; Goumon et al., 2020; Jowett and Amory, 2021). Moreover, it is relevant to assess behavioural synchronicity in pigs given hypothesised ties to a sense of security and cohesion (Špinka, 2012), and the potential for contagion to enhance positive affect (e.g. Fowler and Christakis, 2008). Network analysis can contribute to the assessment of individual social connectivity and overall group cohesiveness.

5.3.3 Behavioural tests

Preference testing and consumer demand

Preference testing was the first 'test-based' approach to assessing animal welfare pioneered in early welfare research (e.g., Dawkins, 1977). It is based on the assumption that we can utilise what animals find positively or negatively reinforcing (as expressed through their preferences or choice behaviour) to establish which resources might induce positive and negative emotional

states (e.g., Dawkins, 2008). Consumer demand testing is a further development of the approach, which aims to assess the strength of motivation underlying preferences (Dawkins, 1990).

Preference testing and consumer demand were developed to scale 'behavioural needs' (Dawkins, 1983; Hughes and Duncan, 1988) or 'what animals want' (e.g., Dawkins, 2008) against a 'hard currency' of resources necessary for fitness (e.g., food). This focus on 'needs' has been criticised, initially on the basis of whether a focus on strongly motivated needs was the correct approach to improving welfare as opposed to a focus on less motivated 'luxury' behaviours that are undertaken only after addressing urgent survival needs (Lawrence, 1987; see also Fraser and Duncan, 1998).

Preference tests, and to a lesser extent consumer demand, have been used to define behavioural motivation of pigs for space, rooting materials, social companionship and thermal comfort (e.g., Jensen et al., 2008; Matthews and Ladewig, 1994; Pedersen and Jensen, 2007). Pigs have been shown to contra-freeload (i.e., 'work' to obtain resources that are also available freely) in a foraging task (de Jonge et al., 2008; but see Young and Lawrence, 2003), which has been interpreted in terms of positive anticipation of reward as well as information gathering (Inglis et al., 1997). Further, in their RICHPIG model, Bracke et al. (2006) take the position that preference and demand equate to positive welfare. Preference testing (including the derived methodology of conditioned place preference) and consumer demand approaches have proven to be useful tools in research on motivation and behavioural neurobiology. Their relevance and utility for positive welfare assessment deserve further investigation and in particular, whether tests of motivational strength are appropriate for evaluating non-homeostatic needs or desires.

Judgement bias tests

A variety of what are referred to as ‘judgement’ or ‘cognitive’ bias tests have been proposed for assessing emotional state and mood in animals. Based on human research, the core idea is that, as emotional state influences cognitive processes, animals’ cognitive processing can be used to infer their underlying emotional state. The approach generally involves conditioning animals to stimuli indicating reward or punishment, and then testing with ambiguous stimuli to see if animals respond to these ‘optimistically’ or ‘pessimistically’ (an optimistic bias interpreted to indicate a positive underlying emotional state; a pessimistic bias the reverse; e.g., Harding et al., 2004; Mendl et al., 2009; Mendl et al., 2010). Various studies have assessed judgement bias in pigs (reviewed by Murphy et al., 2021), the majority directed at assessment of factors inducing negative emotional states, but some now assessing optimistic judgement bias (e.g., Douglas et al., 2012; Slegers et al., 2021). However, various factors may influence the outcome, including coping style and personality traits (Asher et al., 2016; Horback and Parsons, 2022), indicating that additional measures are needed.

Qualitative behavioural assessment (QBA)

QBA arose from the position (partly philosophical and partly biological) that it is valid to study animal behaviour from a qualitative perspective (e.g., Wemelsfelder, 2007). QBA focuses on the expressive quality of the behaviour as opposed to the physical descriptions of behaviour that are usually recorded (Wemelsfelder et al., 2000). An innovative step was to qualitatively assess animal behaviour through free-choice profiling (FCP). FCP allows observers to develop their own qualitative terminology to collect qualitative descriptions of behaviour which can then be statistically analysed using generalised Procrustes analysis (Wemelsfelder et al., 2001). More recently there has been a shift to using fixed-term lists aligned with principal component analysis

(e.g. Muri and Stubbsjøen, 2017). The method developed for Welfare Quality® (2009) involves assessing the intensity of expression of twenty qualitative states varying in emotional valence and arousal on a 125 mm visual analogue scale. The positive descriptors include relaxed, calm, content, friendly, playful, positively occupied, lively, inquisitive, sociable and happy.

Much of the development and validation of the QBA approach has been conducted on pigs (e.g., Wemelsfelder et al., 2000, 2001). Two important developments are worth emphasising. Firstly, in terms of scientific validation, Rutherford et al. (2012) demonstrated that observers using QBA were able to detect qualitative differences in pigs exposed to anxiogenic conditions (an open field or elevated plus maze), where pigs were previously injected with an anxiolytic (anxiety reducing drug) or a saline control. In other words, observers were sensitive to the behavioural changes induced by pharmacological treatment of anxiety. Secondly, in the Welfare Quality® project, QBA was selected as the only reliable and validated measure of positive emotional state for all species including pigs (Welfare Quality®, 2009). QBA has subsequently been applied in studies to assess on-farm pig welfare (Mullan et al., 2011; Temple et al., 2011). Recent work using QBA suggests that pigs show distinct qualitative behavioural responses to different musical harmonic structures, with consonant harmonic music being associated with higher scores for descriptors of positive emotional states (Cardona et al., 2022).

5.3.4 Other (potential) indicators

In addition to the approaches reviewed above, face, ear and tail expressions and movements can provide information about positive affect when used in combination with other measures. For example, Figueroa et al. (2019) used snout openings and tongue protrusions in addition to consumption speed to evaluate the palatability of sweet and umami flavours to pigs. Czycholl et

al. (2020) observed more forward-directed ears in an enriched than barren environment, and Camerlink and Ursinus (2020) identified curled and wagging tails as indicators of positive affect. Laterality in the sensory evaluation and hemispheric processing of environmental stimuli has been linked to emotional valence, with pigs using their right eye for appraisal of a positive stimulus (Goursot et al., 2019). Furthermore, there is a growing body of evidence relating vocal characteristics to positive versus negative emotional contexts (e.g. Briefer et al., 2019; Friel et al., 2019; Briefer et al., 2022). For some of these measures (e.g., aspects of spontaneous behaviour; preference tests), there is a need for further work to confirm their validity as measures of positive welfare in different contexts. Others (judgement bias tests and QBA) have a stronger theoretical link to the concept of positive welfare but as yet few papers have applied them to questions regarding positive welfare in pigs. A key question concerns how measures of positive welfare perform when comparing good with even better welfare conditions as opposed to good versus poor conditions.

5.4 Positive pig welfare in the real world

Pigs are unique in having had a housing system developed entirely on the basis of observations of their natural behaviour. The Edinburgh Family Pen System was designed around observations made of family groups of pigs living in a semi-natural enclosure with the aim of replicating key conditions required for the stimulation of the behaviour patterns observed under ‘unconstrained conditions’ (Stolba and Wood-Gush, 1984, 1989; **Fig. 5.3**). Although the Edinburgh Family Pen System failed to become a commercial reality, it remains a totemic example of the principle of allowing farm animals to live natural lives whilst in a commercial environment. With its focus on facilitating species-typical behaviours such as exploration, foraging, and maternal and neonate

behaviours through providing a generous and structured space with substrates, it could be argued that the Family Pen System was facilitating positive welfare through all the ‘good life opportunities’ envisioned in the recent frameworks. Interestingly, there is no reference to positive welfare terms such as positive emotions or pleasure in the original papers (e.g., Stolba and Wood-Gush, 1989), which reflects that the work was conducted in the 1970s–80s when there was little direct discussion of positive emotions in animal welfare science.

Note: Insert Fig. 5.3 around here

Figure 5.3. Accommodating a boar and four sows with litters, the Edinburgh Family Pen System comprised four covered compartments connected by an outdoor urination/defecation corridor. Each covered compartment contained (A) an innermost nest area, feeding stalls, a rack with straw for nest-building and, by the outdoor corridor, a water nipple, and B) activity area with peat for rooting, a rubbing post, and an elevated log for chewing and levering. Photos: Ruth Newberry.

Mullan et al. (2011) aimed to establish the extent to which UK pig producers went beyond minimum UK legal standards and welfare codes. This study was foundational to the Resource Tier approach (Edgar et al., 2013). The results of Mullan et al. (2011) are summarised in **Table 5.1**. All 15 farms in the study complied with legislation with the possible exception of the provision of enrichment. However, a majority of farms did not meet the higher standards of welfare provision established at the outset of the study. As an example, in relation to enrichment, nine of the farms only provided a single manipulable object and gave no information on whether this object was regularly changed (contrary to recommendations in the code). Of the six farms

that provided straw, they did so either in the form of deep bedding or by the ‘straw-flow’ system. In a follow-up paper on developing Good Life Frameworks, Rowe and Mullan (2022) noted some UK pig farmers providing resource needs above the legal minimum. However, only one producer out of the 11 sampled scored above the legal minimum for provision of an enriched environment (Rowe and Mullan, 2022).

The work of Mullan et al. (2011) and Rowe and Mullan (2022) reflects our experience that the majority of global commercial pig production units fall short in terms of promoting positive pig welfare. For example, if we assume that species-typical behaviours such as exploration, foraging, play, nesting and maternal–offspring interactions are largely synonymous with positive welfare (Bracke and Hopster, 2006; Špinka, 2006), then most pig production facilities around the world fail to provide adequate opportunities for their expression. Similarly, it is our contention that most intensive pig production systems globally do not provide sufficient levels of enrichment materials to facilitate substantial expression of behaviours such as exploration (Pedersen et al., 2014; see also Chapter 13 on enrichment).

Table 5.1 Summary of a study of pig finisher units (n=15) exceeding standards set by legislation and welfare codes. Farms were scored on 6 ‘positive system descriptors’ on a scale of 1–5 (1: meets legal requirements; 2: meets UK welfare code recommendation; 3–5: progressive increases in ‘welfare provision’, i.e., exceeding legal requirement or welfare code) (Mullan et al., 2011).

Positive system descriptors	Numbers of pig finisher units achieving Scores 3 and higher (% in brackets)
Environmental enrichment	6 (40)

Absence of tail docking	0 (0)
Space	1 (7)
Thermal comfort	1 (7)
Physical comfort	9 (52)
Foraging behaviour	3 (20)

5.5 What does positive welfare add to the debate over pig welfare?

Finally, we would like to suggest ways in which the concept of positive welfare potentially adds to the debate over pig welfare.

5.5.1 Raising the bar

As a concept, animal welfare accepts the use of animals by humans, and as much of the focus has been on-farm animal welfare, inevitably ‘practical’ and ‘commercial’ aspects cannot be ignored. Indeed, there has been a growing interest in the use of economics to better understand how to improve animal welfare in the context of other competing issues (e.g., Christensen et al., 2012). One approach to improving welfare that takes account of the difficulties of improving welfare in the ‘real world’ is to consider the minimum improvements required to reduce negatives or ‘harms’, for example the minimum enrichment required to reduce tail-biting in growing pigs (10 g of destructible material such as straw/pig/day; D’Eath et al., 2014; see also Chapter 12). An alternative would be to consider the amount of a resource (or other input) required to maximise a positive welfare outcome. The closest we can find to such a study is Pedersen et al. (2014) who studied the effect of an increasing allocation of straw on exploratory behaviour in

pigs and concluded that 387 ± 10 g of straw per pig per day was the amount needed to satisfy pigs exploratory behaviour; one limitation of this study is that the measure used to assess satisfaction of exploration was reduction in oral manipulation of pen-mates. Thus, different approaches, one aimed at reducing harms and the other aimed at maximising positives can potentially end up with quite different solutions (see **Fig. 15.2**). In effect, this is the same argument made by Lawrence (1987) and by the Resource Tier approach. Edgar et al. (2013) suggest that considering which resources are required to maximise positive welfare outcomes is likely to be more radical in terms of welfare improvements than traditional harm reduction approaches.

[note to publisher: insert Fig 5.4 around here]

Figure 5.4 Hypothetical example of approaching welfare improvements on the basis of aiming to: (a) minimise a negative (harm); (b) maximise a positive outcome. The x-axis represents arbitrary units of a resource that can achieve either (a) or (b) (e.g., straw to (a) reduce tail-biting; (b) act as a stimulus for exploration). The y-axis shows the effect of the amount of the resource in terms of (a) minimising a negative outcome (e.g., tail-biting); (b) increasing a positive outcome (e.g., exploratory behaviour). The downward arrows indicate the approximate ‘efficient provision’ points where thereafter additional amounts of the resource result in only negligible returns. In this hypothetical example, the efficient point for maximising a positive outcome (red) requires at least double the resource input compared to minimising a negative outcome (blue). This concept is based on data from experiments on straw provision (see D’Eath et al., 2014; Pedersen et al., 2014).

5.5.2 New areas for biological discovery

Positive welfare has the potential to open up new channels of science discovery. There are increasing examples of research on positive psychology in nonhuman primates (e.g., studies of subjective well-being in chimpanzees; King and Landau, 2003), and the neurobiology underlying positive emotions (e.g., Burgdorf and Panksepp, 2006; Burgdorf et al., 2017; Alexander et al., 2021). There is also a substantial literature on the brain effects of environmental enrichment (e.g. Singhal et al., 2014; Kempermann, 2019) and a smaller set of studies on the effects of enrichment on the immune system (e.g. Arranz et al., 2010) and on physical health (Cao et al., 2010). However, there has been relatively little research on the biology of positive psychological states in farm animals such as pigs, and also the wider implications of positive welfare for other body systems. A new line of research concerns the wider health implications of positive welfare as elicited by environmental enrichment. For example, Dixhoorn et al. (2016) demonstrated that pigs in ‘enriched’ housing prior to infection with porcine reproductive and respiratory virus (PRRSV) were less susceptible to PRRSV than barren-housed pigs based on faster clearance of the PRRSV in blood serum and fewer histological signs. Later studies have also shown an impact of environmental enrichment on pig immunity (Luo et al., 2020a). This raises many interesting questions, not least being the mechanisms underlying this reported enrichment-induced disease resistance. In addition, determining optimal conditions for promoting resilience in response to environmental change and social losses is a relevant area for future research (Crofton et al., 2015; Luo et al., 2020a). For instance, rearing pigs in enriched conditions in early ontogeny may, on the one hand, build resilience capacities, but a later transfer to worse conditions can, induce negative affective states (Douglas et al., 2012; Luo et al., 2020a, 2020b). Moreover, incorporating expected reward in pig housing and handling systems would be fruitful. For example, individual pigs can be summoned to an automated ‘call feeder station’ through auditory

conditioning (e.g., Zebunke et al., 2013), and pen cleanliness can be encouraged by automated offering of a food treat for use of a pig toilet (Tillmanns et al., 2022). The advent of PLF has opened opportunities for the automation of reward-based training and reinforcement schedules that accommodate individual reward preferences and learning rates and avoid competition among pigs. Further, instead of moving pigs by driving them away from humans, promotion of positive human–animal relationships (Chapter 18) requires rethinking of methods used to move them around within farms and especially on and off vehicles.

5.5.3 Changing human behaviour

There is interest in the role of human behaviour as a target for agricultural sustainability interventions from farmers (Moran et al., 2013) through to consumers and citizens (Mamouni Limnios et al., 2016). Similarly, there has been a growing interest in societal perceptions of animal welfare issues (e.g., Leenstra et al., 2011; Rault et al., 2022; Vigors et al., 2021). Interestingly, when comparing animal welfare scientists' and societal views, Miele et al., (2011) suggested that scientists are more focused on negative welfare aspects (suffering) relative to the public, who tend to spontaneously refer to more positive welfare aspects. This may be because the public expect that animal suffering does not or should not exist in developed countries. In contrast to this earlier work, Vigors (2019) found that members of the public make sense of positive welfare by contrasting positive and negative aspects, for example positive welfare is being 'free from negative experiences'. Furthermore, using a factorial survey with vignettes Vigors et al. (2021) showed that members of the public, similar to farmers, prioritised animal health over freedom to behave normally although overall they saw both as being important to welfare. However, what seems to be missing is an analysis of the relative effectiveness of

focusing on negatives vs. positives in creating behavioural change with respect to animal welfare. In a meta-analysis of studies of 'willingness to pay' (WTP) for welfare improvements, there was no reference to the influence of scenario setting on the outcomes (Lagerkvist and Hess, 2011); in other words, there appears to be no investigation of whether more significant WTP would result from a strategy of small incremental welfare improvements (as in Moran and McVittie, 2008) or more radical welfare improvements (as envisaged in the Resource Tier approach). We propose that there is potential value in investigating whether including positive welfare in campaigns to promote behavioural change is more effective than a more conventional approach.

5.6 Conclusions and future developments

Positive welfare is a relatively new concept when considered from the perspective of intensive pig farming which predominates in the global production of pork meat. This chapter reviews the current literature on positive animal welfare discussing commonalities and distinctions across different published approaches to positive welfare. Specifically in relation to pigs, we submit that the scientific literature remains predominately focused on negative aspects of pig welfare. Second, whilst there are a number of approaches which could be applied to assess positive welfare in pigs, there have been relatively few studies to date and there is a need for further validation and refinement for practical on-farm application. Third, we can find very little data on how pig farms match up against positive welfare descriptors; what data exist suggests that intensive pig production methods are generally inadequate in promoting positive welfare. Finally, we make the case that a focus on positive welfare could positively influence future developments in pig welfare. These include: a change of focus from making small steps to

reduce negatives to more radical changes to maximise positives, discovery of new biological insights into the wider benefits of positive welfare (e.g., on pig health), and greater effectiveness in creating substantive human behavioural change across the supply chain in favour of improved pig welfare.

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