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Review Article

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Behavioral Assessment of Cattle for Improved Performance: The QBA Method

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ABSTRACT

Animal welfare in modern dairy production increasingly encompasses emotional well-being, which directly affects health, productivity and sustainability. Qualitative Behaviour Assessment (QBA) is a non-invasive, whole-animal approach that uses trained observers and fixed lists of behavioural descriptors to evaluate dairy cows' affective states. This narrative review synthesises evidence from peer-reviewed studies and field applications of validated QBA protocols, including recent validations in pasture-based systems. Positive emotional expressions (e.g., relaxed, calm, sociable, curious) are consistently associated with higher milk yield, stable lactation curves and lower disease incidence [1-4,14]. Conversely, negative expressions (fearful, anxious, apathetic, tense) precede or coincide with increased risks of mastitis, lameness and metabolic disorders, exacerbated by poor housing [5-8,11]. Farms routinely applying QBA report earlier detection of welfare issues, reduced veterinary costs and improved reproductive performance, particularly with environmental enrichment [9,10,11]. When integrated with conventional indicators (somatic cell count, locomotion scoring, metabolic profiles), QBA enhances decision-making and supports sustainable herd management [13]. Standardised training and protocol adherence are essential for reliability, accounting for intra-day variations [12]. QBA thus represents a scientifically robust, practical and ethically aligned tool for monitoring emotional welfare in dairy systems, contributing to both animal well-being and farm profitability.

Keywords: Qualitative Behaviour Assessment, dairy Cow, Emotional Welfare, Affective State, Milk Production, Health Disorders, Sustainability

Introduction

The concept of animal welfare has evolved from primarily physical parameters to include affective (emotional) states [1,2]. In dairy cattle, negative emotional experiences increase susceptibility to disease and reduce productivity, whereas positive states enhance resilience and performance [3,4]. Societal and legislative pressure for higher welfare standards has stimulated the search for feasible on-farm assessment methods [5].

Qualitative Behaviour Assessment (QBA) integrates body language, facial expressions and behavioural style into a holistic judgement of animals' emotional valence and arousal using predefined descriptor lists [6,7]. Unlike resource- or health-based indicators, QBA captures early, subtle signs of compromised welfare that may precede clinical disease [8]. Recent studies confirm its validity across housing types, including pasture systems where positive QBA scores correlate with reduced stress during handling [14]. This review evaluates the scientific validity of QBA in dairy cows and its practical implications for health monitoring, productivity and sustainable herd management.

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Review of Literature

QBA was originally developed and validated in pigs [9] and subsequently extended to cattle, sheep, horses and poultry [10-12]. Inter-observer reliability is high when assessors undergo standardised training [13]. In dairy cows, principal component analysis of QBA scores typically reveals two main dimensions: valence (positive–negative) and arousal (relaxed–agitated) [14,15]. Multiple studies confirm significant correlations between QBA scores and physiological stress markers (cortisol, heart-rate variability) and production parameters [16,17]. Systematic reviews highlight QBA's role in Welfare Quality® protocols, though standalone use requires caution due to moderate reliability; integration with other indicators improves practicality [13]. On-farm applications demonstrate QBA's sensitivity to housing conditions, with positive shifts in emotional expressions under enriched environments [2]. Environmental enrichment further validates QBA by shifting scores toward positive affective states [11].

Materials and Methods

A narrative synthesis approach was adopted. Literature was retrieved from Web of Science, Scopus and PubMed using combinations of the terms "Qualitative Behaviour Assessment", "QBA", "dairy cow", "affective state", "welfare" and "productivity" (2000–2025). Only studies employing validated QBA protocols (Welfare Quality® or equivalent fixed-list methods) and reporting correlations with health or production outcomes were included. Grey literature and validated field reports were considered when peer-reviewed evidence was limited.

Results

Emotional Expression and Milk Production

Cows scored as relaxed, calm, content or sociable consistently produced 2–6 kg more milk per day and showed more stable lactation curves than fearful or agitated individuals [3,4]. Pasture access enhances these positive expressions, correlating with lower arousal during routine handling [14].

Negative Emotional States and Health Disorders

Negative QBA scores significantly predicted higher somatic cell counts, clinical mastitis, lameness prevalence and subclinical ketosis up to several weeks before clinical signs appeared [5,19,20]. Housing without enrichment amplifies fearful/bored states, increasing disease risk [11].

Economic and Sustainability Implications

Farms implementing routine QBA reduced treatment costs by 15–30 % and improved conception rates through earlier intervention [9,21]. Enrichment-driven QBA improvements support sustainable practices by boosting resilience in diverse systems [11,13,14].

Discussion

The reviewed evidence confirms that emotional state, as assessed by QBA, is a sensitive indicator of overall welfare and a useful predictor of health and productivity outcomes in dairy cows. Its non-invasive nature and low implementation cost make it particularly suitable for commercial settings. However, intra-day variations necessitate standardized observation times to ensure consistency across farms [12].

Conclusions

Limitations include observer-dependent variability (mitigated by training) and the current lack of fully automated QBA systems [13]. Additionally, while valid in pasture settings, further cross-context validation is needed [14]. Nevertheless, QBA is a scientifically robust, practical and ethically aligned method for assessing emotional welfare in dairy cows. Routine integration of QBA into herd health plans supports early detection of risks, stabilises productivity, reduces economic losses and advances sustainable dairy farming. Future research should focus on sensor-based automation and cross-cultural validation of descriptors, building on enrichment effects [11].

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