

THE STRESS CONCEPT AND WAYS OF ASSESSING THE EFFECTS OF STRESS IN FARM ANIMALS

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ABSTRACT

The uses of the term "stress" are confusingly diverse and a more precise meaning is scientifically desirable. Most usage implies effects on an individual attempting to cope with adversity, which are detrimental, i.e. they cause reduction in fitness. Such coping, whatever the control system involved, may necessitate adrenal mediated increases in available energy, but glucocorticoid levels fluctuate daily and increase during oestrus and courtship, so high levels do not necessarily indicate harm to an individual. The most widespread use of "stress" is as a dynamic term referring to something happening to an individual, but it is also used to mean the external factors and the subsequent state of the individual. The following definitions are therefore proposed.

Stress: The process by which environmental factors over-tax control systems in an individual, thus activating responses whose effects are prolonged and ultimately detrimental to that individual.

Stressors: The environmental factors which lead to stress.

Stress responses: The responses to stressors, or their effects, shown by animals under stress.

The various control systems have different regulatory components, behavioural and physiological mechanisms being alternative and complementary, so there is no single measure of the effects of stress. The levels of hormones, metabolites and metabolic products in blood can be estimated, although sampling procedures affect some levels. For example, in sheep, plasma glucocorticoid levels are increased by restraint, social isolation, dipping, transport, or shearing. Heart-rate changes can be useful predictors of other physiological changes. Antibody levels after pathogen challenge are of interest, since high corticosterone levels can damage the immunological apparatus. On a farm scale, disease incidence, growth, milk yield, reproductive state, and reproductive performance can be measured. Effects detectable after death include brain endorphin levels, adrenal hypertrophy, organ degeneration and gut ulceration.

Behavioural effects of stress include initial hyperactivity or later inactivity associated with reduced alertness and food intake. Stereotyped movements, like chicken head-shaking or calf licking, may take up much time and energy. Inability to carry out movements, such as lying down normally, misdirected behaviour such as nest-building, sucking, or feather-pecking, and excessive fighting are also stress indicators. A situation may be stressful for one individual and not for another according to early experience and genetic constitution.
