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Stress and emotions in animals

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Using The Observer for Animal Behavior Research

Animals respond to inputs from their inner and outer environment with physiological and behavioral changes. They try to maintain a stable state by reacting to disturbances of the inner and outer world: their Umwelt. Under natural conditions an animal predicts and controls its Umwelt by feeding, moving, resting, socializing, communicating, etc. It has the freedom to react. Under restrained conditions, for instance in intensive housing systems, animals are less able to predict and control their own Umwelt. In trying to find solutions for the lack of control many animals develop "problem" behavior. Continuous, purposeless locomotion, chewing and jumping are so-called stereotypies. Study of these stereotypies can give us insight in the problems the animals have in relation to their artificial environment. The causation and function of "problem" behavior are the main subjects of study at the Ethology department of Wageningen Agricultural University. In the next sections, several examples of these behavioral studies are presented.

Stress in pigs

The detailed research of stereotypies concentrates on their causation and function and on the hypothesis that the behavior enables a pig to gain control over the environment. Different types of pigs show different numbers of stereotypies. In the most recent experiments, these types of pigs are characterized by their reaction to challenges in a new environment, a so-called open field. Their behavior is videotaped, with a time code added to the video track, under sham and drug treatment (related to endogenous opiates). The tapes are coded with the Video Tape Analysis (VTA) system, which combines video and time code hardware and The Observer software. The VTA system allows for recording of behavior, activity (line crossings) and the posture of the pig in the open field. Quickly moving pigs can be analyzed in slow-motion replay, while non-activity episodes can be easily scanned with a fast playback speed. Regardless of the playback speed, the videotape and behavioral record are synchronized. Furthermore, errors can be corrected and details may be filled in later. In all cases, the VTA system is more accurate than timing based on the internal computer clock and proves to be very time-efficient. In other experiments observational data are integrated with heart rate recordings. Switches between stereotypic and non-stereotypic behavior turn out to be are accompanied by an immediate change in heart rate. Pathological data from hearts after slaughter, reactions to novel environments, effects of drug treatments and behavior-heart rate relationships support the hypothesis that, although stereotypies are an indication of chronic stress, individuals that show many stereotypies show less severe physiological stress symptoms.

Chicken vocalizations

When hens do not find the expected food or dustbath at a certain time and place, they show an increased activity and often utter very specific graded vocalizations, called Gakeln. These vocalizations can be regarded as expressions of the emotional or psychological state of the hen. Analysis of these vocalizations shows an immense variation between the calls with a common denominator in the first note being longer than the subsequent ones. The more of these vocalizations uttered, the higher the motivation to eat or dustbath. The crows of cocks are specific discrete vocalizations and have a function in territorial advertizing. They appear to convey information about the physical state of the rooster. Detailed analysis of the crows with the Signal Sound Analysis System show for example that the length of the fourth note (doo from cock-a-doodle-doo) is shortened ("tiredness"). The hypothesis that crowing is an indicator of strength is also supported by the significant decrease in number of crows in a sequence and the decrease in length of the last note of the crow after 24 h of food deprivation. Detailed analysis of crows recorded under different physical conditions is currently under way.

Time budgets in zoo animals

The effect of housing conditions on the behavior, and especially stereotypic behavior, is also investigated in zoo animals. Comparisons of the time budgets of individuals of different species between zoos with the help of The Observer software (with the Psion Organiser as handheld computer) showed that stereotypic behavior was mainly found in carnivores that are kept with few conspecifics in relatively small enclosures. The analysis of the oral stereotypies of giraffes was greatly simplified by use of the VTA system. Detailed analysis of mouth movements revealed large individual differences and lots of oral "problem" behavior in giraffes. All results point in the direction of less adequate food presentation in time, quantity and place. On the basis of this behavioral evidence, environmental enrichment projects are now started.

Welfare of Scottish Highland cattle

Except for red deer, the Dutch fauna lacks large natural grazers. Cows and horses are used as semi-wild grazing "machines" in the management of nature reserves. Sometimes the grazers are not exploited but self-regulatory. We want to know under what circumstances which individuals in the social organization have a reduced health and welfare and are at risk of dying under severe seasonal weather conditions. Behavioral research on the social structure of the bulls, cows and calves centers on individual differences. It is supported by The Observer and Psion Organisers equipped with weatherproof cases. Furthermore, bull vocalizations during the rut are analyzed with the Signal analysis system. The vocalizations of the bull are qualitatively and quantitatively dependent on the position in the dominance rank. Vocalizations could be used as indicator of the strength of these bulls. The behavioral research is supported by genetic analysis of the relationships between the individuals.

Conclusion

Ethological studies on farm and zoo animals show the importance of behavioral research to interpret the effects of intensive and extensive farming methods in terms of welfare. By observing and listening to behavioral and vocal expressions of animals we gain a better understanding of their physical and psychological state under restrained conditions.

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