Genetic improvement of robustness

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Dairy farmers call for more robust cows as exemplified by the interest in cross-breeding and other breeds. It can be questioned whether selection for health, fertility and longevity in an average environment addresses this request for robustness sufficiently. Especially when robustness is defined as "the capacity to handle disturbances in common, sustainable and economical farming systems". Several genetic concepts exists that may allow selection for robustness more directly, including or not the interaction with environment. A first concept is to select against (or for) environmental sensitivity using reaction norms. Some studies indicate that in a continuously improving environment, selection for increased performance leads to increased sensitivity (i.e. reduced robustness). The second concept that may enable for direct selection for robustness is to account for genetic heterogeneity of environmental variance. Genetic heterogeneity of environmental variance can be considered as genetic differences in environmental sensitivity to random micro environmental fluctuations. A third concept that might enhance selection for robustness directly might be to take into account the social effect that an animal has on its herd mates. Such social effects appear to be important for improving robustness in other species (Bijma et al. 2007), and might be of interest in dairy cattle, for example, to avoid spreading of mastitis within a herd or improving feeding and grazing behaviour at herd level. These aspects of robustness in interaction with selection for improved milk quality, will be investigate din EU project RobustMilk.