

The psychological impact of the Foot and Mouth Disease crisis on Dutch dairy farmers

E.H. Van Haaften¹, M. Olff² and P.H. Kersten^{3,*}

¹ Vabene, Research and Training on Sustainable Systems, Rooseveltkade 344, NL-6707 GW Wageningen, The Netherlands

² MFO Psychiatry AMC/De Meern, Academic Medical Center (AMC), University of Amsterdam, Amsterdam, The Netherlands

³ Alterra, Wageningen University and Research Centre, Wageningen, The Netherlands

* Corresponding author (tel: +31-317-474790; fax: +31-317-474812; e-mail: paul.kersten@wur.nl)

Received 6 October 2003; accepted 24 March 2004

Abstract

Farmers in general have to deal with many changes upon which traditional behaviour or knowledge has no answer. One of these is the European policy to combat epidemic livestock diseases as happened in the Netherlands in 1998 with Swine Fever and in 2001 with Foot and Mouth Disease (FMD). The psychological impact of the FMD-policy has hardly been investigated. In this study this impact was studied among dairy farmers by comparing areas with different severity of the crisis. Subjects came from one cultural group: Dutch dairy farmers (n = 661). Questionnaires about stress, psychological marginalization and depression were administered in three different areas: the 'culled' area, the 'buffer' area and the FMD-'free' area. The psychological impact of the FMD-crisis was associated with differences in levels of stress, marginalization and depression. It was concluded that the impact of the FMD-crisis was considerable, especially for farmers in the 'culled' area.

Additional keywords: stress, marginalization, depression, The Netherlands, dairy farmers

Introduction

General

In many parts of the world, farmers are facing changes for which their experience provides limited guidance. In many areas, political, social and economic changes are undermining the viability of traditional patterns of decision-making. These and other

forces originating outside the community or the immediate region add to transition processes that often have mainly local determinants such as intensification of production, growing scarcity and degradation of resources, and sharpening conflicts over their use (Loevinsohn *et al.*, 2002). Government policy on large epidemic animal diseases like Swine Fever and Foot and Mouth Disease (FMD) can be added to the fundamental changes that are confronting farmers' lives and resource management.

In 2001, countries all over Europe were acting urgently to try to halt the spread of FMD from its source in the UK. In the Netherlands and England, research on its economic and social impact was published one year later (Bennett *et al.*, 2002; Franks, 2002; Phillipson *et al.*, 2002; Van Haften *et al.*, 2002).

The Netherlands struggled with the epidemic from March till July 2001. During this period 270,000 animals were culled, 200,000 of them after having been vaccinated. The Ministry of Agriculture, Nature and Food Quality was the first responsible for the management of the crisis. After the crisis, complaints about lack of communication by the ministry during the crisis and signals of health problems from the affected farmers and their families grew. Consequently, the Innovation Network of the Ministry of Agriculture, Nature and Food Quality asked the research institute Alterra of Wageningen University and Research Centre to assess the health conditions of the farmers who were hit by the crisis.

The eco-cultural model of Berry

Adaptation to changing living conditions at population level across cultures can be understood only if at the individual level both cultural and ecological features are taken into account, as shown in Figure 1 by the eco-cultural model of Berry *et al.* (1992). The main feature of this model is the distinction between the population and the individual level of analysis. This reflects the originality of an interdisciplinary cross-cultural approach that draws on social sciences such as anthropology, demography, human geography and sociology to place individual psychological functioning in a socio-cultural context (Dasen, in press). Interdisciplinarity, especially interdisciplinary communication, appears to be a vital condition for the effective application of science in achieving sustainable production of goods and services. Sustainable agricultural production is no exception: the problems in the agricultural sector are complex and can only be resolved through interdisciplinary co-operation (Van Haften, 2002).

The eco-cultural model of Berry *et al.* (1992) provides a general guide to distinguishing classes of variables and their relevance for the explanation of similarities and differences in human behaviour and experience that can be found across cultures. The model is useful from an interdisciplinary perspective and makes it possible to present feedback from a social perspective to a veterinary, virological or other more technical solution for – like in this case – an animal disease.

While the general flow in the model (Figure 1) is from left to right, feedback arrows represent influences from individuals back to the other variables in the framework. So the model is not limited to simple cause and effect relationships, but is potentially open to interactive or dialectical relationships such as those emphasized in action theory and cultural psychology (e.g. Boesch, 1991). At the extreme left in Figure

two major classes of influence (background variables of ecological and socio-political context) and at the extreme right the psychological consequences are presented. The latter usually are the focus of psychological research, including both observable behaviour and inferred characteristics such as motives, abilities, traits and attitudes. The two middle sets of variables (process variables) represent the transmission or influence from population variables to individuals, and include both biological and cultural factors.

More specifically, the ecological (social and physical) context is the setting in which human organisms interact with the physical environment; it is best understood as a set of relationships that provide a range of possibilities for life of a population. Such an interactive point of view is the essence of an ecological approach and allows us to avoid the pitfalls of earlier approaches, such as that of 'environmental determinism'. The central feature of this environmental context is economic activity. However, each form of economic activity implies a different kind of relationship between the local human population and the animal and physical resources of their habitat (Van Haaften, 2002).

In this study in the Netherlands the political context is the context for resilience of the farmers concerned. We shall only present the impact of the crisis on the 'observable behaviour', and shall not include the effect of the process variables. The behavioural outcome of this study was measured as stress, marginalization and depression.

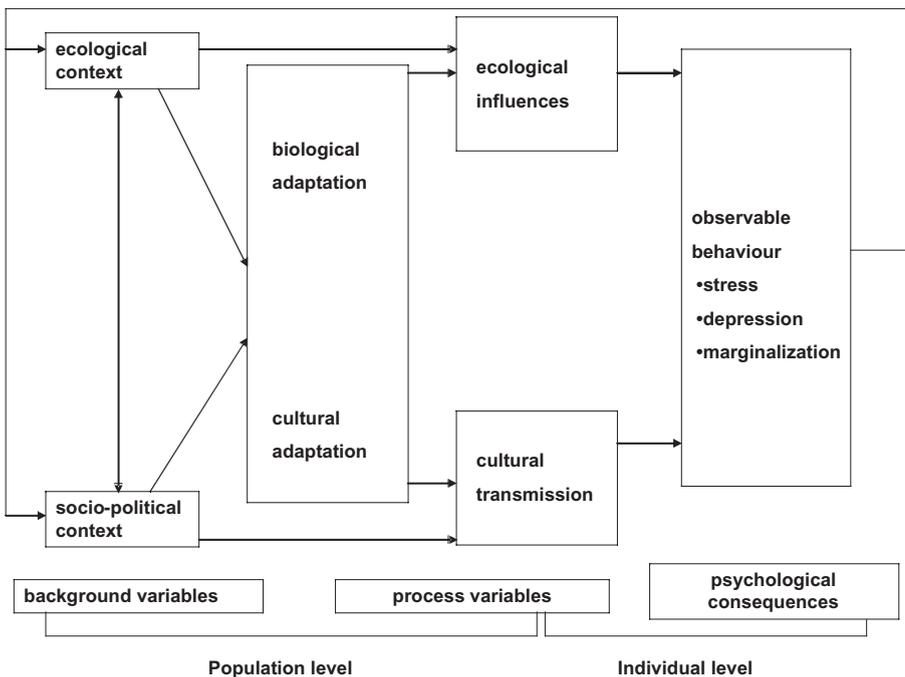


Figure 1. Eco-cultural model of Berry *et al.* (1992) as used in this study.

Stress

Stress is defined here as the psycho-biological consequences of one or more stressors (Ursin & Olf, 1993). It is widely recognized that stress has psycho-biological consequences. Stress is highly related to mental health as well as to subjective physical health problems (e.g. Olf *et al.*, 1993; 1995). It also affects neuro-endocrine levels and may even compromise the immune system (Olf, 1999).

Cary & Weston (1978) studied farmers in Australia who faced a serious drop of income after a fierce decline of meat prices in 1974 and a collapse of the prices of milk powder on the international market in 1976. The farmers experienced considerably more stress and hostility than did a control group of non-farmers. In research on the impact of environmental degradation, Van Haaften (2002) found that people living near forests with more enduring and more severe degradation would report more stress.

Marginalization

Marginalization amounts to culture loss. This can occur in the context of rapid cultural change when new and serious challenges have to be met, such as environmental degradation or the breakdown of social institutions. Neither the old culture nor the new, often modern Western culture is seen as providing the tools to adequately cope with the problems of daily life. In its extreme form, marginalization can lead to severe social disruption. In highly marginalized groups women, children, old or sick people are often ignored by their relatives or by the community. More powerful groups deny access to vital resources to particular groups. Marginalization can even threaten the very existence of a cultural group.

A preference for marginalization implies little or no interest in or opportunity of cultural maintenance (often because of enforced cultural loss), and little or no interest in establishing or maintaining relations with members of the host culture (often for reasons of exclusion or discrimination). Marginalization is probably better viewed as a state of permanent crisis than as a mode of adaptation (Berry & Kim, 1988; Marsella & Dash-Schreuder, 1988). Marginalization can have various adverse consequences, both at cultural and psychological level (Kealy, 1989; Kleber *et al.*, 1992). At group level, established patterns of authority, civility and welfare no longer operate; at individual level, hostility, uncertainty, identity confusion, and depression frequently emerge.

Depression

Depression appears to be on the rise cross-culturally, as documented by a study of 39,000 subjects across the world (Anon., 1992). The causes are still unclear, but are likely related to the enormous social changes that occur in modern times (Westen, 1996). The transactional nature of the relation between coping, stress and mental health should be acknowledged (Aldwin, 1994). Depression has equivalents in every culture, but the way people view and experience depression varies considerably (Westen, 1996). In earlier studies on the link between ecology and culture, depression

appeared strongly correlated with stress and psychological marginalization (Van Haaften, 2002).

In our study the hypothesis was that there would be significant differences between the regions, with highest scores on stress, marginalization and depression in the area where the animals had been culled.

Materials and methods

Procedure

In the Netherlands in 2001, many farmers (dairy farmers, pig farmers, hobby farmers) and civilians (hotel, restaurant and catering industry, tourist industry and shopkeepers) were affected by the FMD-crisis. As it appeared important to keep cultural differences between interviewees as small as possible, a specific group of farmers was interviewed so that a relatively homogeneous sample was obtained. The interviewees consisted of dairy farmers only.

During a five-day training of 11 pollsters – 4 women and 7 men – the trainees translated (and retranslated) the English questionnaires into Dutch. During this training the interviewers were also instructed how to administer the questionnaires during the interviews. Interviewer and interviewee were always of the same gender.

In the FMD-region three areas were assessed that contrasted in terms of management to get control over the disease (Figure 2). The three areas were considered necessary to see whether and how the crisis affected the farmers, as there was no comparison in time possible.

The three areas can be described as follows:

1. An area with dairy farmers whose livestock had been culled; the ‘culled’ area.
2. An area outside the area where livestock had been culled but with dairy farmers who were under severe control; the ‘buffer’ area.
3. A FMD-‘free’ area, without culling or control.

The selection of persons was done in consultation with the farmers’ organizations.

A large part of the farms in the culled area were visited. Representative farms were obtained by choosing at random from lists of farms. On the farms preferably the farmer and his wife were interviewed.

Not all farmers were willing to be interviewed. In the culled area 58% of the invited farmers co-operated. In the buffer area this was 56% and in the FMD-free area 40%. In the culled area the most important reason for not participating was “not willing to dig up all misery again”, whereas in the buffer area this was “makes no sense” (40%), and in the FMD-free area “no time” (35%). There was no difference in demographic data between responders and non-responders (Table 1). In all, 661 dairy farmers were interviewed.

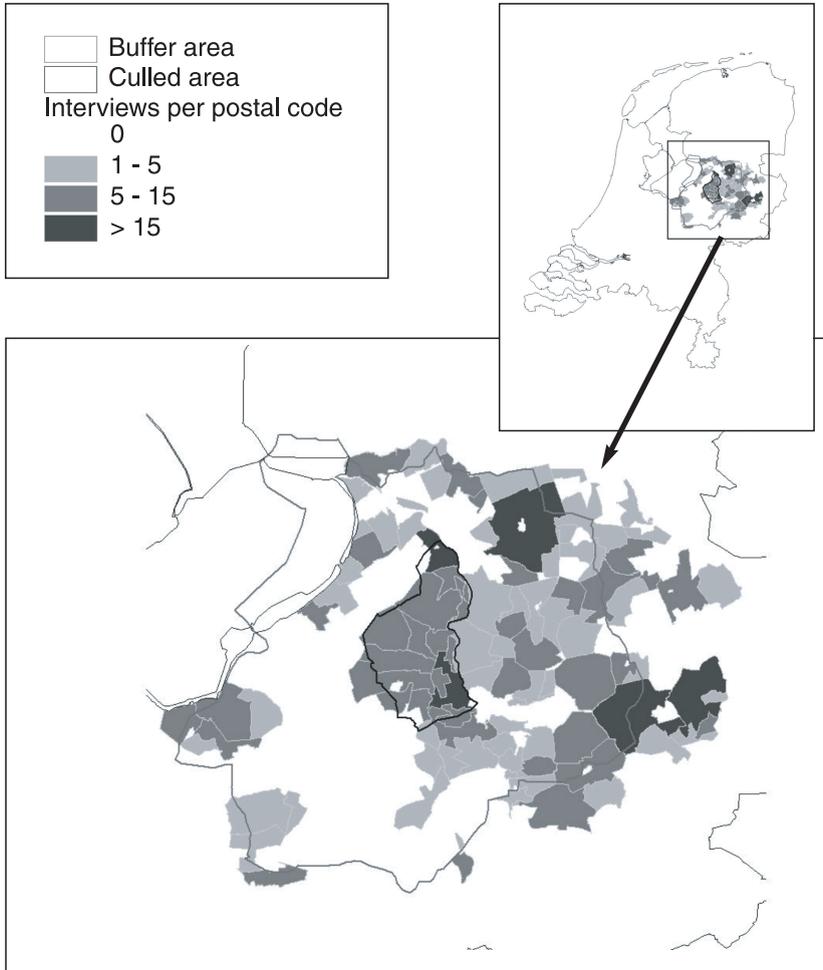


Figure 2. Location and map of the area of research.

Instruments

Symptom Check List-90

To assess the level of stress (i.e., distress), 20 items of the Symptom Check List-90 (SCL-90), (Arrindell & Ettema, 1986) were used. The SCL-90 is a world-wide used instrument for the assessment of symptoms of anxiety, depression, somatization and hostility. The 20 items used in this study included subjective physical and mental problems with questions like "Do you have nightmares?" They represent a general measure of distress and have been proven reliable and valid indicators of distress in previous studies (Van Haaften, 2002, Van Haaften *et al.*, 2002). The reliability (Cronbach's α) in the current sample was 0.77.

Table 1. Characteristics of the farms and participants in the study.

Characteristic	Number of participants						
	Total	Culled area		Buffer area		FMD ¹ -free area	
<i>Gender</i>							
Male	348	111		132		105	
Female	313	104		110		99	
Total	661	215		242		204	
<i>Age range (years)</i>							
		Male	Female	Male	Female	Male	Female
18–34	71	9	13	20	16	6	7
35–44	249	41	39	48	37	39	45
45–54	197	35	33	35	34	35	25
55–64	123	22	15	23	19	22	22
≥ 65	21	4	4	6	4	3	0
<i>Level of education</i>							
Primary	10	4		5		1	
Primary vocational	244	84		91		69	
Secondary vocational	367	114		131		122	
Higher vocational	40	13		15		12	
<i>Household size (members)</i>							
1–2	102	39		37		26	
3–4	277	84		101		92	
5–6	247	86		93		68	
> 6	35	6		11		18	
<i>Cultivated area (ha)</i>							
0–15	44	19		13		12	
16–30	242	65		100		77	
31–45	251	76		88		87	
≥ 45	124	55		41		28	
<i>Milk quota (kg year⁻¹)</i>							
0–250,000	133	60		29		44	
250,000–450,000	280	87		114		79	
450,000–550,000	127	34		52		41	
550,000–650,000	50	12		19		19	
> 650,000	71	23		27		21	

¹ FMD = Foot and Mouth Disease.

Marginalization

Marginalization was assessed with Mann’s (1958) 14-item scale, which is a cumulative scale. It is often used in intercultural research with questions like: “I feel that I don’t belong anywhere”, or “I regret the decisions I have made”. In previous studies it appeared a valid indicator of distress (Van Haften, 2002; Van Haften *et al.*, 2000). The reliability (Cronbach’s α) in the current sample was 0.61.

Beck Depression Inventory

The Beck Depression Inventory (BDI) (Beck *et al.*, 1961; 1988) is a 21-item self-rating scale for depression. This instrument is a worldwide valid and reliable indicator of depression, with statements like “I am disappointed in myself” and “I postpone taking decisions more than formerly”. The reliability (Cronbach’s α) in the current sample was 0.80.

Results

Background information

Demographic data and other background information on the dairy farmers in this study are presented in Table 1. Analysis of variance showed that there were no statistical differences in demographic or background variables between the three areas.

The results of the analysis of variance on the mental health indicators are listed in Table 2. All dependent variables (stress, marginalization and depression) differ statistically between the areas, with highest scores in the culled area. There were no statistically significant interactions with age, sex or education.

Table 2. Differences in mental health indicators between the three areas.

Indicator	Culled area		Buffer area		FMD ¹ -free area		Area effect ² F (2,66)
	(n = 215)		(n = 242)		(n = 204)		
	mean	SD ³	mean	SD	mean	SD	
Stress	23.7	3.2	23.1	3.0	23.1	2.7	3.7*
Marginalization	16.5	2.1	15.9	1.6	16.1	1.8	6.8**
Depression	4.4	3.6	2.7	2.9	2.5	3.0	23.6***

¹ FMD = Foot and Mouth Disease.

² * = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$ (two-tailed).

³ SD = standard deviation.

Discussion

Stress, marginalization and depression as observable behaviours in Berry's socio-cultural model (Figure 1) give an interesting feedback to the policy on battle an animal disease. Although government and farmers had the same enemy, i.e., the FMD-virus, the implementation of the policy of eradication led to psychological consequences for farmers that had not been foreseen or intended, and at the same time almost completely denied.

The hypothesis that levels of stress, marginalization and depression of informants would be significantly different between the areas and thus dependent on the level of crisis severity was confirmed. The farmers who had their animals culled suffered most. There is ample evidence to suggest that stress following a crisis and leading either to unexplained physical and/or to psychological complaints is common across the world. Numerous studies find that the prevalence of, for example, fatigue, ranges from 20% to 50% across different countries and cultures. Similar findings have been reported for symptoms such as headache and muscle pain (for a full review see Wessely *et al.*, 1998). Often no conventional biomedical explanation can be found for these complaints and consequently they are often called unexplained medical symptoms. Stress may be preceding subjective health complaints. Depressive complaints and feelings of psychological marginalization (Van Haften, 2002) often go together with high stress levels.

It is difficult to exactly interpret the figures of the impact, but three major stressors can be indicated. Firstly, on the whole the communication at farm level between the 'governmental' organization and the farmers was very poor. This gave rise to a lot of confusion and anger. But even at the national level the alternative policies offered by the farmers to manage the crisis were not heard or considered by the responsible minister.

Secondly, the government almost completely denied that farmers and farmer families have bonds with their animals. Government personnel seem to have a perspective on farm animals as pure production means, while for most farmers it is much more. The herd has often been created by fathers and grandfathers with great care and knowledge. Sons and daughters feel obliged to continue this effort and care, and the culling means a crude frustration of their commitment. But the families also told us about more direct bonds with the animals.

Thirdly, during the crisis the autonomy of the farmer was almost completely taken away. In the Dutch agricultural sector the farmer is the most central entrepreneur. In this kind of situation one would expect a bottom-up communication. However, during the FMD-crisis this was not the case at all. The communication was completely top-down and all autonomy of the farmers was taken away. This inevitably led to the farmer families feeling hopeless and helpless during the culling.

Conclusion

The eco-cultural model of Berry appeared to function well in giving feedback at 'individual level'. By taking large samples more general trends can be quantified. Compared with farmers who live in a buffer area or outside the affected region the psychological and emotional state of farmers was heavily affected by the culling of their animals and destroying their 'business'. As probably part of them will develop physical complaints this effect should be taken into account when calculating the costs of the crisis.

Although FMD is an animal disease, its consequences for farmers and their families are serious and policies of preventing and fighting the virus should include the (social) effects on humans. As the agricultural sector is likely to be affected by similar emergencies in the future, it appears necessary to collect as much information as possible on the FMD crises from the past and make adaptations from bottom to top in the political context.

Limitations of the study are methodological. Firstly, this study was based on interviewer-assessed questionnaires. Secondly, there was no structured interview for diagnosing depression or other psychopathology.

Further research is needed to investigate the exact stressors during a crisis like FMD. It appears also necessary to investigate the difference in attitudes between farmers and government. It does not appear logic that such a crisis is managed with agricultural production and virological arguments only, as it leaves a large proportion of the farmers in such a situation that they may need psychosocial help. This fact can also be interpreted the other way round. The government failed to communicate with their farmers as committed partners to involve them in the management of the crisis in such a way that no humans had to be left the way we described above: stressed, psychologically marginalized and depressed.

References

- Aldwin, C.M., 1994. Stress, Coping, and Development. An Integrative Perspective. The Guilford Press, New York, 331 pp.
- Anonymous, 1992. The changing rate of major depression: Cross-national comparisons. *Journal of the American Medical Association* 268: 3098–3105.
- Arrindell, W.A. & J.H.M. Ettema, 1986. Manual for a multi-dimensional psychopathology indicator. Swetz & Zeitlinger, Lisse. (In Dutch)
- Beck, A.T., C.H. Ward, M. Mendelson, J. Mock & J. Erbaugh, 1961. An inventory for measuring depression. *Archives of General Psychiatry* 4: 561–571.
- Beck, A.T., R.A. Steer & M.G. Garbin, 1988. Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review* 8: 77–100.
- Bennett, K., T. Carroll, P. Lowe & J. Phillipson, 2002. Coping with crisis in Cumbria. *Town and Country Planning* 72(3): 78–81.
- Berry, J.W., 1976. Human Ecology and Cognitive Style: Comparative Studies in Cultural and Psychological Adaption. Wiley, New York, 242 pp.
- Berry, J.W. & U. Kim, 1988. Acculturation and mental health. In: P.R. Dasen, J.W. Berry & N. Sartorius

- (Eds), *Health and Cross-Cultural Psychology. Toward Applications*. Sage, Newbury Park, California, pp. 207–237.
- Berry, J.W., Y.H. Poortinga, M.H. Segall & P.R. Dasen, 1992. *Cross-Cultural Psychology. Research and Applications*. Cambridge University Press, Cambridge, 459 pp.
- Boesch, E.E., 1991. *Symbolic Action Theory and Cultural Psychology*. Springer, Berlin.
- Cary, J.W. & R.E. Weston, 1978. *Social Stress in Agriculture: the Implications of Rapid Economic Change*. University of Melbourne, Parkville, 64 pp.
- Dasen, P.R. (in press). Theoretical frameworks in cross-cultural developmental psychology : An attempt at integration. In: T.S. Saraswathi (Ed.), *Cross-Cultural Perspectives in Human Development: Theory, Research and Applications*. Sage, New Delhi.
- Franks, J., 2002. *Farming after Foot and Mouth*. Centre for Rural Economy, Working University of Newcastle upon Tyne, Newcastle upon Tyne.
- Kealy, D.J., 1989. A study of cross-cultural effectiveness: Theoretical issues practical applications. *International Journal of Intercultural Relations* 13: 387–428.
- Kleber, R.J., D. Brom & P.B. Defares, 1992. *Coping with Trauma: Theory Prevention and Treatment*. Swets and Zeitlinger, Lisse, 317 pp.
- Loevinsohn, M.E., J.A. Berdegué & I. Guit, 2002. Deepening the basis of rural resource management: learning processes and decision support. *Agricultural Systems* 73: 3–22.
- Mann, J., 1958. Group relations and the marginal man. *Human Relations* 11: 77–92.
- Marsella, A. J. & A. Dash-Schreuder, 1988. Coping culture and healthy development: A research and conceptual overview. In: P.R. Dasen, J.W. Berry & N. Sartorius (Eds), *Health and Cross-Cultural Psychology. Toward Applications*. Sage, Newbury Park, California, pp. 163–179.
- Olf, M., 1999. Stress, depression and immunity: the role of defense and coping styles. *Psychiatry Research* 85: 7–15.
- Olf, M., J.F. Brosschot & G. Godaert, 1993. Coping styles and health. *Personality and Individual Differences* 15: 81–90.
- Olf, M., J.F. Brosschot, G. Godaert, R.J. Benschop, R.E. Ballieux, C.J. Heijnen, M.B.M. De Smet & H. Ursin, 1995. Modulatory effects of defense and coping on stress-induced changes in endocrine and immune parameters. *International Journal of Behavioural Medicine* 2(2): 85–103.
- Peterson, A.C., B.E. Compas, J. Brooks-Gunn, M. Stemmler, S. Ey & K.E. Grant, 1993. Depression in adolescence. *American Psychologist* 48: 155–168.
- Phillipson, J., P. Lowe & T. Carroll, 2002. *Confronting the Rural Shutdown: Foot and Mouth Disease and the North East Rural Economy*. Centre for Rural Economy Research, University of Newcastle upon Tyne, Newcastle upon Tyne.
- Ursin, H. & M. Olf, 1993. The stress response. In: C. Stanford, P. Salmon & J. Gray (Eds), *Stress: an Integrated Approach*. Academic Press, London, pp. 3–22.
- Van Haafden, E.H., 2002. *Linking ecology and culture: towards a psychology of environmental degradation*. PhD thesis University of Tilburg, Tilburg, 140 pp.
- Van Haafden, E.H., P.H. Kersten & W. Boer, 2002. *Resilience*. Alterra, Wageningen University and Research Centre, Wageningen, 213 pp. (In Dutch)
- Westen, D.I., 1996. *Psychology: Mind, Brain and Culture*. Wiley, New York, 733 pp.
- Wessely, S., J. Bisson & S. Rose, 1998. A systematic review of brief psychological interventions ('debriefing') for the treatment of immediate trauma related symptoms and the prevention of post-traumatic stress disorder. In: M. Oakley-Browne, R. Churchill, D. Gill, M. Trivedi & S. Wessely (Eds), *Depression, Anxiety and Neurosis Module of the Cochrane Database of Systematic Reviews* (2nd edition). Updated Software, Oxford.

