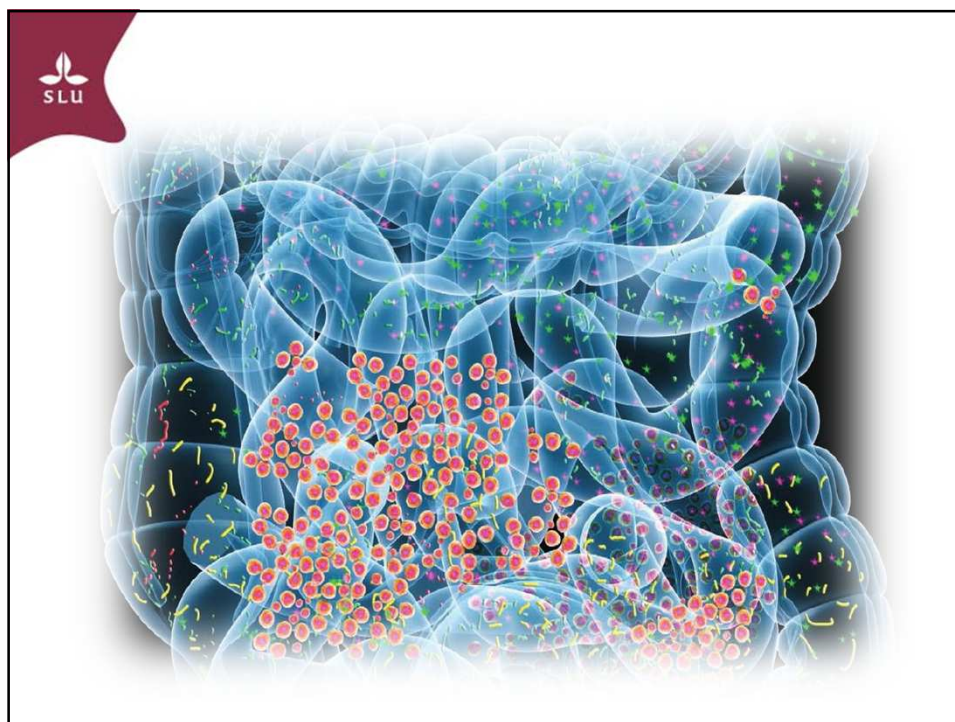


## ***The importance of microbial exposure early in life***

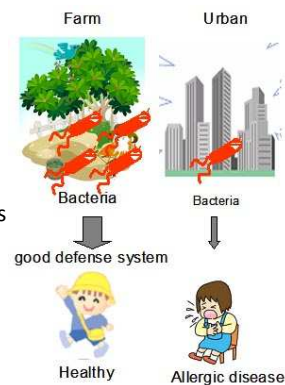
Åsa Vilson, DVM, PhD-student  
Department of Clinical Sciences  
Swedish University of Agricultural Sciences



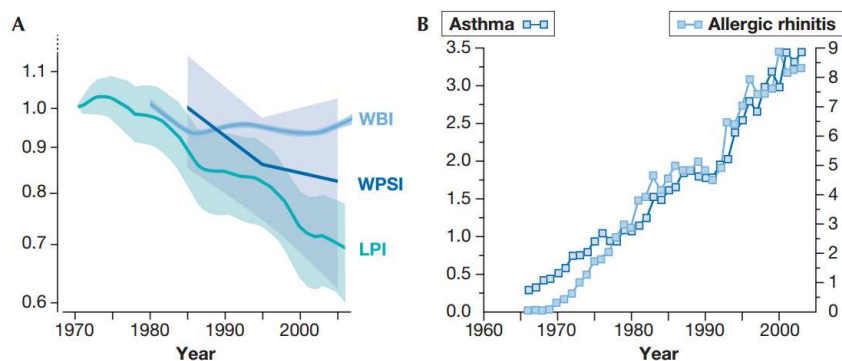


## Hygiene hypothesis

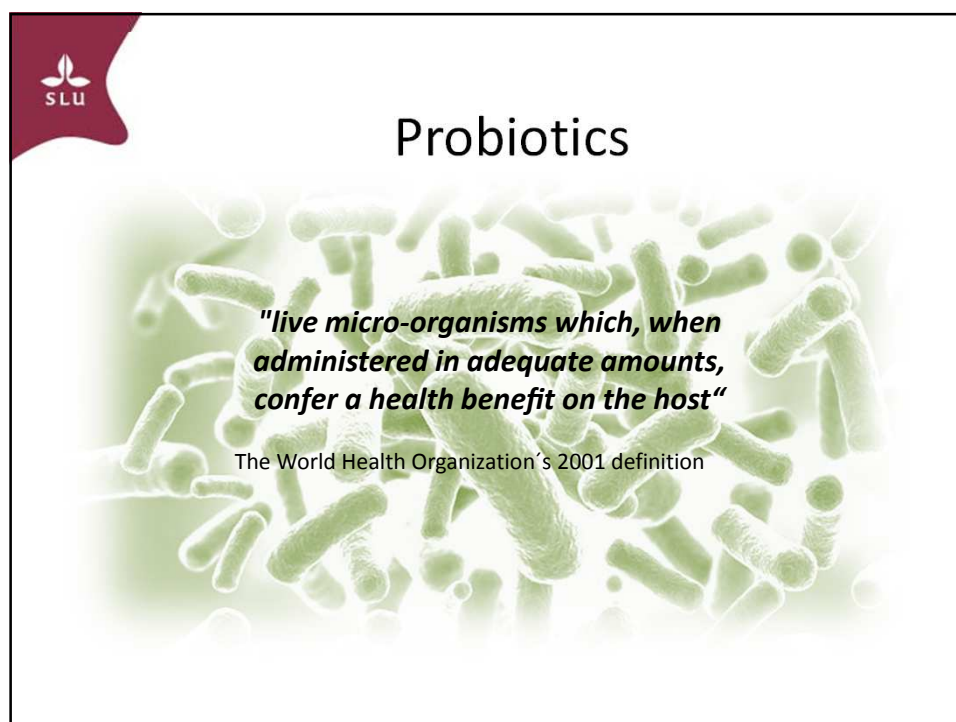
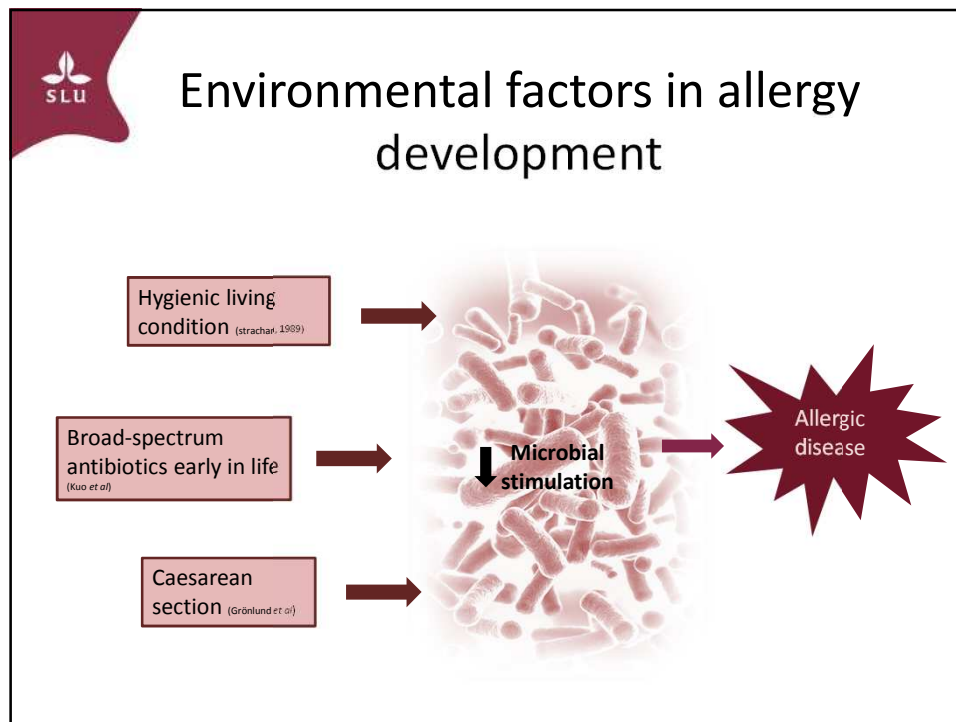
- Rapid increase of allergic disease the past decades in humans and dogs in westernized countries
- Strachan, 1989:
  - ✓ Hygienic conditions in early life → lack of microbial exposure affects the balance of the immune system → development of allergic diseases
  - ✓ Association between the prevalence of hay fever/atopic dermatitis and the family size
  - ✓ The higher infection rate of children with older siblings may decrease the risk of allergic diseases
  - ✓ Children growing up in farming environment had reduced risk of asthma and wheezing



## Hypothesis of biodiversity



**Fig 1** | Two global megatrends in biodiversity and public health. (A) Declining biodiversity since 1970 as measured by three indices. LPI, Living Planet Index; WBI, World Bird Index; WPSI, Waterbird Population Status Index (Butchart *et al*, 2010). (B) Increasing trends in the prevalence of inflammatory diseases. Asthma and allergic rhinitis among military conscripts from 1966 to 2003 (Latvala *et al*, 2005) are shown as an example.





## Probiotics as immune-modulators in dogs

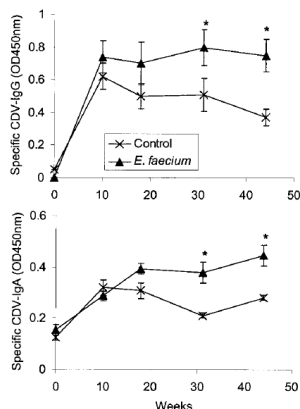


FIGURE 3 Specific anti-canine distemper virus immunoglobulin IgG (upper panel) and IgA (lower panel) in the plasma collected at wk 0, 10, 18, 31 and 44 from puppies fed diets with or without SF68. Values are means  $\pm$  SEM,  $n = 7$ . \*Different from control,  $P < 0.05$ .

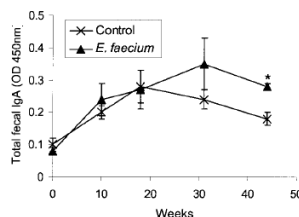


FIGURE 1 Total immunoglobulin IgA in the fecal contents collected at wk 0, 10, 18, 31 and 44 from puppies fed diets with or without SF68. Data are means  $\pm$  SEM,  $n = 7$ . \*Tended to be higher than control,  $P = 0.056$ .

Benyacoub *et al.*  
J. Nutr. 133: 1158–1162, 2003.



## Probiotics as prevention of atopic dermatitis

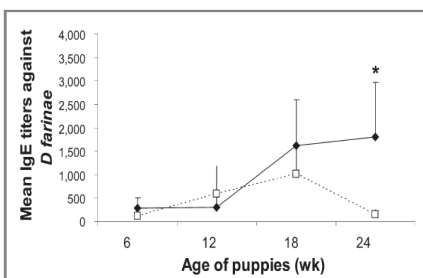


Figure 2—Mean  $\pm$  SEM serum titers of IgE against *D. farinae* in 2 litters of puppies with experimentally induced AD that were not (diamonds [first litter];  $n = 7$ ) or were (squares [second litter]; 9) treated with LGG (5 capsules/d [approx.  $100 \times 10^9$  CFUs/d] from 3 weeks of age to 6 months of age). Serum titers in both litters were evaluated when puppies were 6 to 24 weeks of age. \*Values differ significantly ( $P < 0.001$ ) between litters at indicated age.

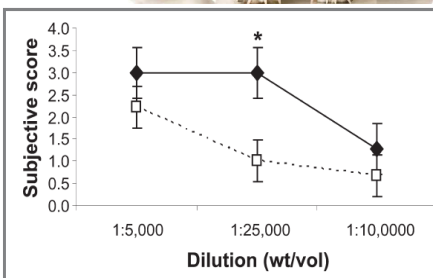
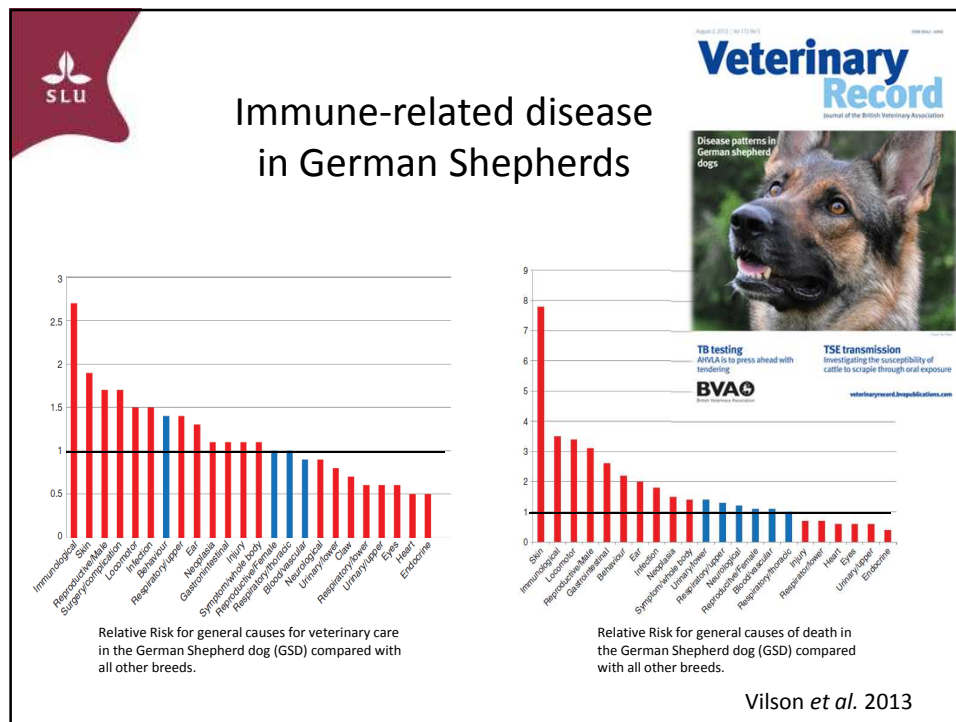


Figure 3—Mean  $\pm$  SEM scores for results of skin reactions to intradermal injection of *D. farinae* at various dilutions in 2 litters of puppies with experimentally induced AD that were not (diamonds [first litter];  $n = 7$ ) or were (squares [second litter]; 9) treated with LGG (5 capsules/d [approx.  $100 \times 10^9$  CFUs/d] from 3 weeks of age to 6 months of age). \*Values at indicated dilution were significantly ( $P < 0.001$ ) different between litters.

Marsella *et al.*  
Am J Vet Res 2009;70:735–740)



**SLU**

## Conclusion

The gut microbes are essential for the brain, for the immune system, for the general health and even behavior.

The increased prevalence of immune-related disease in westernized countries may be a result of a decreased biodiversity in the environment and in the gut microflora.

Probiotics are of interest as potential immune-modulators.

German Shepherd Dogs are predisposed to immune-related disease.



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