115 Wildlife threat for disease transmission to domestic livestock.
S. C. Olsen*, *National Animal Disease Center*, *Ames, IA*.

The role of wildlife as reservoirs for emerging or re-emerging diseases in domestic livestock has increased in importance over the last decade. Although this review will primarily focus on diseases issues in the United States, disease issues related to the interface between wildlife and domestic livestock are being increasingly recognized worldwide. Pathogens transmitted between wildlife and domestic livestock include viruses, bacteria, and protozoa, which in many instances are zoonotic. For some diseases, wildlife were initially infected from domestic livestock, whereas in others, the disease was most likely endemic in wildlife hosts. Examples of cattle diseases transmitted from wildlife include: brucellosis, tuberculosis, Johne's disease, bovine viral diarrhea, and neopsora. Examples in swine, include brucellosis, pseudorabies, influenza, and exotic viruses. Rabies, West Nile, and equine protozoa myelitis (Sarcocystis neurona) are examples of diseases transmitted from wildlife to horses. In poultry, influenza and newcastle's disease are examples. Changes in livestock housing and husbandry practices have influenced transmission of diseases from wildlife. Disease transmission has also been impacted by human recreational activities, changes in land use and demography, and changes in wildlife populations and their behaviour. Current knowledge would suggest that reservoirs of disease in wildlife will continue to impact domestic livestock. New vaccines, diagnostics, treatments, and changes in husbandry/management will be necessary to minimize the economic impact of wildlife diseases on domestic livestock.

Key Words: Disease, Transmission, Wildlife

116 Providing veterinary healthcare to underserved counties in Pennsylvania through credentialed veterinary technicians.
D. W. Remsburg*, D. T. Galligan, and J. D. Ferguson, *University of Pennsylvania School of Veterinary Medicine*, *Kennett Square*.

Providing healthcare and preventative medicine to food animals is critical to maintaining food safety, national biosecurity and farm sustainability. Based on 2006 data obtained from the AVMA and AABP seven Pennsylvania counties (10%) have farms in dairy or beef production without a resident veterinarian in food supply veterinary medicine (FSVM). Based on a profile of Pennsylvania farm size and expected expenditures to bovine veterinarians, counties with at least one FSVM practitioner had a mean veterinary healthcare expenditure of $1.2 million, $274,421 per food animal veterinarian. Counties with no FSVM practitioners were assumed to have little or no veterinary service but based on dairy and beef animal numbers, had a potential mean veterinary healthcare expenditure of $220,729; this represents approximately 80% of the expected expenditures needed to support a veterinarian. Counties with FSVM veterinarians had a mean value of 6,515 total cattle (6,220 beef and 2029 dairy) per vet; counties without FSVM practitioners had on average 7,329 total cattle including 5,757 beef and 1571 dairy cattle. However, the density of veterinary expenditures was substantially lower in counties without FSVM practitioners ($383/sq. mile) compared to counties with FSVM veterinarians ($1,877/ sq. mile). This may account for the disparity in veterinary service since veterinarians wishing to engage in bovine practice would have to travel farther between farms, thereby diluting earnings at each farm. Credentialed veterinary technicians could expand the range of current neighboring practices or be remotely supervised by their veterinary employers in satellite practices. This provides veterinary practices the opportunity to increase the number of farms served and thereby increase their market for high profit margin services or products. Additionally, it provides a cost-effective solution that will ensure Pennsylvania's dairy and beef producers have access to the veterinary healthcare resources required to remain sustainable.

Key Words: Veterinary Technician, Veterinary Shortage, Rural Veterinary Service

117 A Bootstrap method for the estimation of reference intervals of biochemical parameters.
C. Dimauro*[1], P. Bonelli[2], P. Nicolussi[2], N. P. P. Macciotta[1], and G. Pulina[3], [1]*Dipartimento di Scienze Zootecniche University of Sassari*, *Sassari, Italy*, [2]*Istituto Zooprofilattico Sperimentale per la Sardegna*, *Sassari, Italy*, [3]*AGRIS Sardegna*, *Sassari, Italy*.

Reference intervals are largely used in veterinary medicine being a fundamental element for making clinical diagnosis on animals. The International Federation of Clinical Chemistry (IFCC) recommends the use of both parametric and non-parametric methods to estimate reference intervals. For both methods, the necessary condition is that a sample of at least 120 apparently healthy individuals has to be used. In this paper we suggest a method based on bootstrap procedure to reduce, without losing accuracy, the minimum number of requested apparently healthy individuals to discover reference intervals for biochemical parameters. Bootstrapping is a computer intensive resampling method that allows to estimate the population mean and its standard error (SE). Reference intervals for biochemical parameters are then calculated as $(m\pm 2s)\pm 1.96\sqrt{(s^2(1/n+2/(n-1)))}$, where m is the bootstrap mean, n is the sample size and $s=SE\bullet\sqrt{(n)}$ where SE is the bootstrap standard error. Reference intervals were calculated using a decreasing sample size on a dataset of 14 biochemical parameters measured on 120 apparently healthy Sarda dairy sheep. An example of estimated reference intervals for alanine aminotransferase (ALT) and aspartate aminotransferase (AST) using this approach is shown in table 1. Results suggested that the limits of reference intervals were efficiently estimated until a minimum sample of around 60 animals and began to diverge below this limit.

Table 1: Bootstrap reference intervals and 95% CI (in brackets) for ALT and AST for decreasing sample size in dairy sheep

Sample size	ALT(U/L)		AST(U/L)	
	Reference limits		Reference limits	
	Lower	Upper	Lower	Upper
120	9.4 (7-12)	37.7 (35-40)	63.3(52-75)	212.8(201-224)
80	9.4 (7-12)	37.6 (35-40)	62.7(48-77)	214.8(200-229)
70	9.2 (6-12)	37.7 (35-41)	62.4(47-79)	213.8(198-229)
60	9.2 (6-12)	37.5 (34-41)	63.1(47-80)	211.4(195-228)
50	8.9 (5-13)	38.1 (35-44)	61.4(43-80)	213.0(195-231)

Key Words: Reference, Interval, Bootstrap