Related Publications

CONFERENCE PROCEEDINGS

Gummow, B., Bastianello, S.S., Botha, C.J., Basson, A.T., 1992. Vanadium air pollution: A possible cause of "Ill-thrift" in dairy cattle. *Proceedings of XVII World Buiatrics Congress and XXV American Association of Bovine Practitioners Conference*. St. Paul, Minnesota, USA, volume 3:299-305.

Gummow, B., Bastianello, S.S., Botha, C.J., Basson, A.T., 1992. Vanadium air pollution: A possible cause of "Ill-thrift" in dairy cattle. *Proceedings of the 9 th Faculty Day Congress*. Faculty of Veterinary Science, University of Pretoria. 1 October, paper no.2.

Gummow, B., Bastianello, S.S., Botha, C.J., Smith, H.J.C., Basson, A.J., Wells, B., 1994. Vanadium air pollution: a possible cause of 'illthrift' in dairy cattle. *The Kenya Veterinarian*, Special Issue, (Proceedings of the 7 th International Symposium on Veterinary Epidemiology and Economics, Nairobi, 15-19 August), 18 (2):74

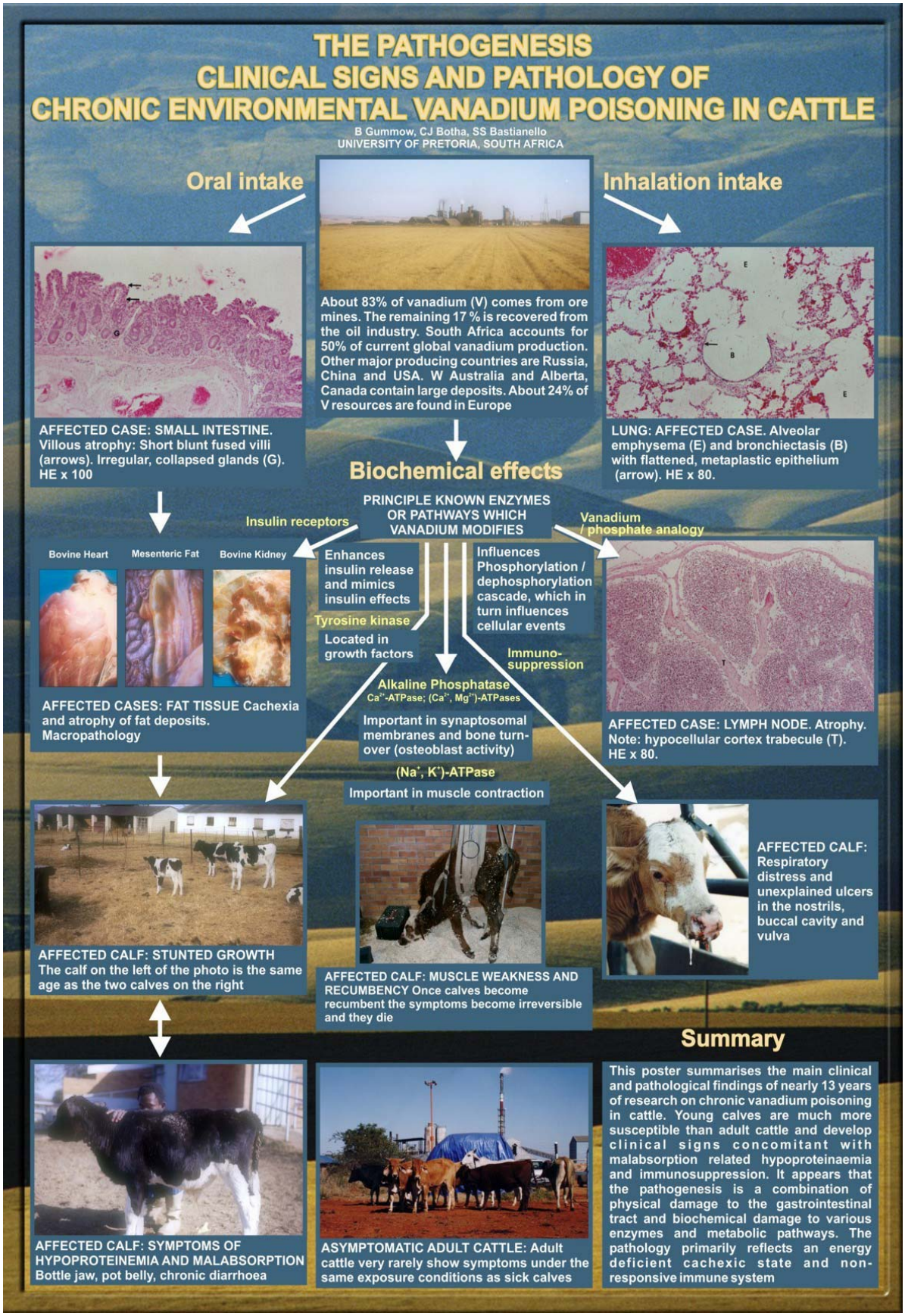
Gummow, B., Kirsten, W, Heesterbeek, J.A.P., Noordhuizen, J.P.T.M., 2004. The use of beef cattle within the vanadium mining industry for in situ monitoring of complex metal exposures. *Environmental and Health Aspects of Mining, Refining and Related Industries* Mowana Safari Lodge, Kasane, Botswana, 28th June to 2nd July

Gummow, B., Kirsten, W., Heesterbeek, J.A.P. & Gummow, R.J., 2004. A stochastic model for determining exposure doses for beef cattle used for *in situ* monitoring of complex metal exposures within the vanadium mining industry *Proceedings of the Southern African Society of Veterinary Epidemiology and Preventive Medicine*, Pretoria, 25-27 August, 69-78

CONFERENCE POSTERS

Gummow, B., Botha, C.J., Bastianello, S.S. 2004. The pathogenesis, clinical signs and pathology of chronic environmental vanadium poisoning in cattle. Annual Congress of the Society for Veterinary Epidemiology and Preventive Medicine, Martigny, Switzerland, 24-26 March

Gummow, B., Botha, C.J., Bastianello, S.S. 2004. The clinical signs, pathology and pathogenesis of chronic environmental vanadium poisoning in cattle. *Proceedings of the Southern African Society of Veterinary Epidemiology and Preventive Medicine*, Pretoria, 25-27 August, 91-92


THE PATHOGENESIS
CLINICAL SIGNS AND PATHOLOGY OF
CHRONIC ENVIRONMENTAL VANADIUM POISONING IN CATTLE
B Gummow, CJ Botha, SS Bastianello
UNIVERSITY OF PRETORIA, SOUTH AFRICA
Oral intake
Inhalation intake
About 83% of vanadium (V) comes from ore mines. The remaining 17 % is recovered from the oil industry. South Africa accounts for 50% of current global vanadium production. Other major producing countries are Russia, China and USA. W Australia and Alberta, Canada contain large deposits. About 24% of V resources are found in Europe
AFFECTED CASE: SMALL INTESTINE. Villous atrophy: Short blunt fused villi (arrows). Irregular, collapsed glands (G). HE x 100
LUNG: AFFECTED CASE. Alveolar emphysema (E) and bronchiectasis (B) with flattened, metaplastic epithelium (arrow). HE x 80.
Biochemical effects
PRINCIPLE KNOWN ENZYMES OR PATHWAYS WHICH VANADIUM MODIFIES
Insulin receptors
Vanadium / phosphate analogy
Bovine Heart
Mesenteric Fat
Bovine Kidney
Enhances insulin release and mimics insulin effects
Tyrosine kinase
Located in growth factors
Influences Phosphorylation / dephosphorylation cascade, which in turn influences cellular events
Immuno-suppression
Alkaline Phosphatase
Ca2+-ATPase; (Ca2+, Mg2+)-ATPases
Important in synaptosomal membranes and bone turn-over (osteoblast activity)
(Na+, K+)-ATPase
Important in muscle contraction
AFFECTED CASES: FAT TISSUE Cachexia and atrophy of fat deposits. Macropathology
AFFECTED CASE: LYMPH NODE. Atrophy. Note: hypocellular cortex trabecule (T). HE x 80.
AFFECTED CALF: STUNTED GROWTH The calf on the left of the photo is the same age as the two calves on the right
AFFECTED CALF: MUSCLE WEAKNESS AND RECUMBENCY Once calves become recumbent the symptoms become irreversible and they die
AFFECTED CALF: Respiratory distress and unexplained ulcers in the nostrils, buccal cavity and vulva
Summary
AFFECTED CALF: SYMPTOMS OF HYPOPROTEINEMIA AND MALABSORPTION Bottle jaw, pot belly, chronic diarrhoea
ASYMPTOMATIC ADULT CATTLE: Adult cattle very rarely show symptoms under the same exposure conditions as sick calves
This poster summarises the main clinical and pathological findings of nearly 13 years of research on chronic vanadium poisoning in cattle. Young calves are much more susceptible than adult cattle and develop clinical signs concomitant with malabsorption related hypoproteinaemia and immunosuppression. It appears that the pathogenesis is a combination of physical damage to the gastrointestinal tract and biochemical damage to various enzymes and metabolic pathways. The pathology primarily reflects an energy deficient cachexic state and non-responsive immune system

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The cattle sentinel project received the approval of both the Research and Ethics Committees of the Faculty of Veterinary Science, University of Pretoria and was registered as project no. 36.5.381

Curriculum Vitae

Qualifications

1976	Natal Senior Certificate	Westville Boys High School, Natal
1983	BVSc	University of Pretoria
1988	BVSc(Hons) (Clinical Pathology 700; Statistics 101, 102, 103, 104 and Toxicology 700)	University of Pretoria
1989	Physiology 700; Pharmacology 700	University of Pretoria
1993	Pharmacology 800 (distinction)	University of Pretoria
1993	MMedVet (Pharmacology)	University of Pretoria
2004	Dipl.ECVPH	European College of Veterinary Public Health

Employment record

2000 - Head of the Section on Veterinary Epidemiology, Economics and Risk Assessment within the Department of Production Animal Studies, Faculty of Veterinary Science, Onderstepoort

1996-1999 - Functional unit head of half the Department of Animal and Community Health, Faculty of Veterinary Science, Onderstepoort.

1995 - Associate Professor, Department of Animal and Community Health, Faculty of Veterinary Science, Onderstepoort.

1993-1995 - Senior Lecturer, Department of Veterinary Public Health

1991-1993 - Senior Lecturer, Department of Infectious Diseases

1988-1991 - Researcher, Section of Toxicology, Veterinary Research Institute, Onderstepoort

1987-1988 - Researcher, Section of Technical Statutory Advice, Veterinary Research Institute, Onderstepoort

1985-1987 -Researcher, Section of Bacteriology and Reproductive Diseases, Veterinary Research Institute, Onderstepoort

1983-1985 -National Service Veterinarian in the South African Medical Services.

Publications and presentations

- 25 refereed research papers
- 6 posters
- 4 non-referred scientific papers
- 32 presentations at local and international conferences
- 8 major contract reports for industry
- 8 interactive veterinary epidemiology workshops / courses
- 4 television interviews
- 9 dissertations promoter/co-promoter

- MMedVet Thesis: *A bioequivalence evaluation of two commercial diminazene aceturate formulations administered intramuscularly to cattle.* (External Examiner: Prof. C. R. Short, Department of Veterinary Physiology, Pharmacology & Toxicology, School of Veterinary Medicine, Louisiana State University, Baton Rouge, Louisiana, USA.)