

# The Use of Ram Genotype To Control Within Flock Clinical Scrapie Epidemics: A Descriptive Analysis



I.D. Stewart, S.C. Tongue

Veterinary Laboratories Agency, Addlestone, Surrey KT15 3NB, UK

**Introduction:** In Great Britain, the national Voluntary Scrapie Flocks Scheme (VSFS) and the statutory EC Compulsory Scrapie Flocks Scheme require the use of National Scrapie Plan (NSP) group 1 ARR/ARR rams in scrapie affected flocks. The VSFS allows occasional derogations for type 2 rams.

**Can control be achieved with less stringent criteria?**

**Aim:** To investigate the effect of ram genotype usage, as selected by the flock owner, on control of within flock epidemics of clinical scrapie

## Study design:

Within a study to investigate the epidemiology of scrapie within affected flocks

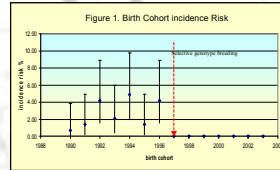
### Inclusion criteria

- >=0.5% incidence
- Homebred own replacements
- PrP genotyping
- Stock rams
- Results returned
- Future year's ram lambs
- Ewes not genotyped

### Advice provided on genotype

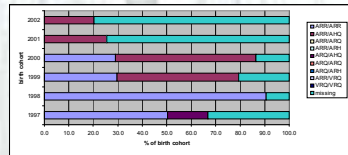
- Associated risk of clinical scrapie and rams allele contribution to offspring

## Flock 1 – control achieved through predominantly ARR/ARR rams



Welsh, 493 – 640 head, 1995 – 2004 follow up, confirmed epidemic 1995 – 2001 (5.7 yrs), AIR max 3.0% in 1996, confirmed cases VRQ/VRQ, ARQ/VRQ, ARR/VRQ.

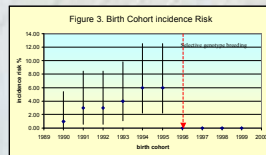
Figure 2. Ram genotypes for lambs as percentage of birth cohort



## Methods:

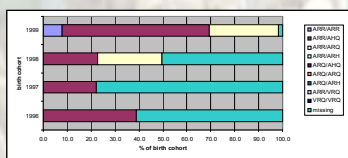
- Descriptive analysis
- Criteria for inclusion were sufficient follow up time (equal to average age at death of cases in flock) and sufficient data.
- Confirmed Annual Incidence Risk (AIR) % = (Total n of confirmed cases died in that calendar year/Flock size in that year)\*100
- Birth Cohort Incidence Risk % = (Total n of confirmed cases in BC/ n in BC)\*100
- Ram genotype as % of birth cohort - for each BC – n sired by ram(s) of each genotype
- Flock size based on just-before-lambing

## Flock 2 – control achieved through predominantly NSP group 2 rams

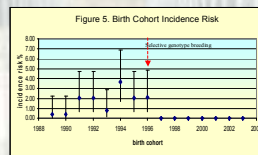


Swaledale/ Mule, 308 – 340 head, 1996 – 2000 follow up, confirmed epidemic 1991 – 2000 (8.9yrs), AIR max 3.6% in 1997, confirmed cases ARQ/ARQ, ARQ/VRQ.

Figure 4. Ram genotypes for lambs as percentage of birth cohort

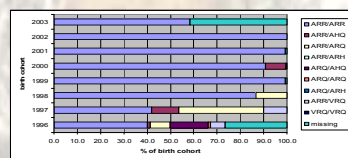


## Flock 3 – control achieved through predominantly ARR/ARR rams

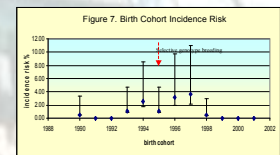


Clunx, 982 – 1161 head, 1996 – 2003 follow up, confirmed epidemic 1991 – 2000 (8.9yrs), AIR max 1.3% in 1997, confirmed cases VRQ/VRQ, ARQ/VRQ, ARR/ARH.

Figure 6. Ram genotypes for lambs as percentage of birth cohort

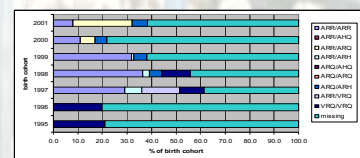


## Flock 4 – control achieved through NSP group 1 - 3 rams



Crossbreed / bleu, 507 – 852 head, 1997 – 2003 follow up, confirmed epidemic 1993 – 2001 (7.9yrs), AIR max 1.4% in 1998 & 2000, confirmed cases VRQ/VRQ, ARQ/VRQ, ARH/VRQ, ARR/VRQ.

Figure 8. Ram genotypes for lambs as percentage of birth cohort



## Discussion:

- 13 flocks appeared to achieve control at birth cohort level through ram genotyping, these took no other action that would have affected the course of the epidemic.
- Other farms were affected by culls or FMD in 2001.
- NSP group 1 to 3 rams were used. Ram genotypes were not known for all animals. The flock owner was able to use a breeding strategy appropriate to his own situation.

• Clinical scrapie controlled, not necessarily infection – some farms had sufficient follow up to indicate control of infection likely, others not.

• Achieved at birth cohort level - clinical epidemic declined, the confirmed epidemic continued. If genotype targeted cull, an immediate decline would have occurred.

## Conclusion:

Breeding strategies, as controlled by the flock owner, utilising rams of genotypes not exclusively NSP group 1, appears to achieve control of clinical scrapie epidemics at the birth cohort level.

### Further work

- In depth cohort analysis
- Investigation of infection in sheep from these flocks



### References:

1. Department for Environment, Food & Rural Affairs (2004). National Scrapie Plan: Scheme Booklet and Contract: Voluntary Scrapie Flocks Scheme.
2. Department for Environment, Food & Rural Affairs (2005). Scheme Booklet: Compulsory Scrapie Flocks Scheme

### Acknowledgements:

Flock owners including the Warborough flock, Defra, Past & present project staff including – Brian Henderson, Linda Hoinville, Mike Dawson, Alles Hoek, Anna Murray, Charlotte Cook, Rachel Eglon

This work is part of a Defra funded project investigating the epidemiology of scrapie

Contact: Sue Tongue BVSc MSc MRCVS, Epidemiology Group, Centre For Epidemiology & Risk Analysis, VLA Weybridge, Surrey, UK, s.tongue@vla.defra.gsi.gov.uk

Veterinary Laboratories Agency (VLA) - An Executive Agency of the Department for Environment, Food & Rural Affairs