Potential introgression pathways and strategies for wider utilization of the *FecB* gene in Maharashtra State and other parts of India

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Introgression

Introduction of a major gene into a breed by a process of backcrossing

Why introgress FecB?

- Increase in litter size caused by FecB in Deccani moderate and manageable
- This increase leads to an increase in income
- Most Indian sheep breeds are reared for meat production and have single lambs
- Lambs are sold on a ‘per head’ basis
- Will improve biological and economic efficiency of sheep rearing
- Will yield returns to sheep owners year after year

Introgression: some important points

- Donor breed NARI Suwarna or NARI Composite rather than Garole
- Classical backcrossing program
  - at least three cycles of backcrossing to achieve 88% genes of the target breed
- Introgress only those FecB carrier animals that are considered superior by local sheep owners
- NARI has 100 BB rams currently and can supply 50 B+ and 50 BB rams every year

Program for introgression

Rams		Ewes	
Breed	FecB genotype	Breed	FecB genotype
NS/NC	BB	Local (~ 500)	++
Local **selected**	++	F1	B+
Local **selected**	++	BC1	B+
BC2	B+	BC2	B+

First step: Identify suitable breeds and regions

- A small number initially
- Breeds primarily used for lamb production
- Similar in size to Deccani or bigger
  - Introgressing into larger breeds should result in increased lamb birth weight and survival (Davis and Hinch 1985)
  - Examples: Sangamneri strain of Deccani, Muzaffarnagari, Patanwadi, Nellore
- Initially choose regions with good grazing resources

Second step: Surveys and studies

- Survey sheep owners: production system, economics, social and cultural significance
  - Evaluate management and marketing practices
  - Attitude to twinning
  - Breeding objectives
  - Ram and ewe selection criteria
  - Explain consequences of prolificacy introduction
  - Identify receptive sheep owners with necessary resources

Concurrent second step in institutional flocks

- Start process of FecB introgression through backcrossing
- Test options for management of FecB carrier ewes and their lambs
- Develop packages of 'genetics and management strategies for different regions

Third step: Introgression into smallholder flocks

- Start introgression when homozygous carrier rams with 88% local genes are available
- Rams should be selected and highly superior to increase chances of success
- Animal identification and performance recording
- Extension and training programs
- Incentives: management and veterinary advice

Introgression through rams

- Possible adaptation problems with introduction of ewes
- Introgression through rams only practical route as AI in smallholder flocks not feasible
- Involves time lag
- Daughters of rams will express the gene
- Additional profits realized about 30 months after ram introduction

Infrastructure required at the institution which will manage introgression

- To maintain large sheep flock and carry out backcrossing
- Recording and data analysis
- Continuous production and dissemination of BB rams
- Network among sheep owners and extension and training activities
- Facilities to carry out genotyping (not necessary if available elsewhere)

Opportunities

- Seasonal rainfall climate with adequate forage for at least 3-4 months
- Potential for supplementation at critical times in some areas and flocks
- Low lamb mortality (~5%)
  - Genetic potential for multiple births could be increased to good advantage (Bradford 1985)

Conclusions

- Worthwhile to introgress FecB more widely (?)
- Introgression into Lonand strain of Deccani can be started with NARI Suwarna rams
- For other breeds 3-4 generations of backcrossing necessary
- Smallholder shepherds likely to welcome introgression if FecB carrier animals have preferred phenotype and are profitable.