Use of biotechnology for sustainable intensification of sheep rearing on the Deccan plateau in India

Chanda Nimbkar
Director, Animal Husbandry Division
Nimbkar Agricultural Research Institute (NARI)
Phaltan, Maharashtra
India
Outline of presentation

- Introduction to NARI and the AH Division
- Deccani sheep production system and constraints
- Causes and procedure of FecB gene introduction and dissemination
- Management and advantages
- Conclusions
Established in 1968 by Mr. B.V. Nimbkar
Registered Public Trust (NGO)
Non-profit Research and Development Institute
Governed by
  - Board of Trustees
  - Governing Council
Three main areas of work
  - Crops
  - Livestock (sheep and goats)
  - Renewable energy
About 90 funded projects undertaken so far
Animal Husbandry Division

- Established 1990.

- Small ruminant development to improve efficiency of resource use and incomes
  - A centre for help and information to goat and sheep rearers: AI, veterinary care, nutrition, management
  - Introduction of the Boer goat breed from southern Africa into India and crossbreeding with local village goats
  - Sustainable internal parasite control research
  - Introgression of the FecB gene into Deccani sheep: CSIR 2007 Award for ‘Science and Technology Innovations for Rural Development’
  - Research on new nutritious fodder plants and trees
Setting the scene: Deccani sheep

- Maintained by smallholders in 3 south Indian States
- Deccani sheep population 20 million
- Grazed on crop residues, fallow lands, road verges, range lands: supervised grazing
- Housed in open sheds at night
- Sale of lambs major source of income
- 2% of ewes have twins
- Lambs sold at 3.5 months at 10-15 kg
- First genetic improvement initiative to increase prolificacy and efficiency
Changing environment faced by sheep rearers

- Declining grazing resources and reduced productivity of existing grazing areas
- Increasing difficulties in migration
- Increasing demand for and price of live sheep and sheep meat
- Need to fulfill protein nutrition requirements of a growing population
- Sheep rearing still a profitable livelihood option
- Need to increase productivity and efficiency of resource use
Why prolificacy improvement?

- 95% income comes from sale of lambs
- Increasing demand and price for lambs
- Personal supervision and management
- Cross fostering of lambs common practice
- Moderate increase in litter size would be profitable
Introduction of FecB mutation from Garole sheep

- FecB: Single base mutation
- Increases ovulation rate and therefore litter size by about 60%
- Mutation introduced through crossbreeding
- Two generations of backcrossing needed to reduce other undesirable features of Garole
- Use of DNA test for detection of mutation
- Five years preparation, ten years breeding, five years publicity, extension and dissemination
Gel photo for detecting the FecB mutation
Dissemination

- Introduction of rams into local flocks
- Two years to see results
- Resistance to change
- Now 250 FecB carrier ewes in 10 flocks
- Shepherds’ ingenious solutions to problems
Dissemination of 100 B+ ewes to smallholder sheep owners - 13 January 2010

Loans from State Bank of India
Advantages of FecB introduction

- FecB carrier ewes adapted to local harsh conditions of grazing
- 30-50% increase in:
  - number of lambs available for sale
  - total weight of lambs produced per ewe
- can maximize benefit with a little expenditure on supplementary feeding
- Therefore 30-50% increase in net income
Lamb management in local flocks
Conclusion

- Increase in litter size moderate, manageable and profitable in smallholder flocks
- Genetic improvement is permanent.
- New strain needs to be registered.
- Approach should be cautious and considered.
Acknowledgements

- FAO
- Australian Centre for International Agricultural Research (ACIAR)
- Department of Biotechnology, Government of India
- Participating smallholder sheep owners
- My colleagues at NARI
Thank you