

Session 4 : Biotechnology and Developing Countries
Opportunities and CHALLENGES
Strategies For Dissemination Of GM Animals
INDIA

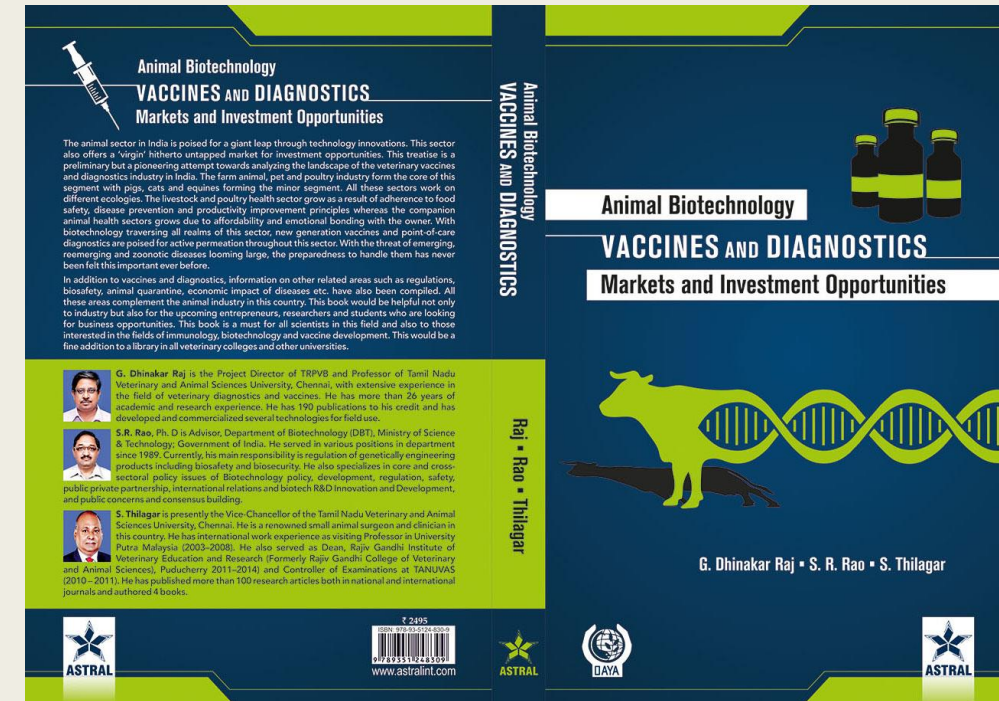
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Science & Technology
Government of India

OPPORTUNITIES

Importance of Livestock in Indian Economy

- 4.4 percent. Contribution in GDP
- 24.7 to Total Agricultural GDP
- 5.6 per cent Annual growth Rate
- 3.3 per cent annual growth rate in Agriculture sector
- 512 million Total Livestock
- 750 million Poultry population
- Apprx 22.45 million people work in the livestock sector



LIVESTOCK POPULATION 2013-14*

Species	2011-12	2012-13	2013-14
Cattle	36.9	38.3	39.7
Buffalo	32.7	33.7	34.6
Sheep	28.4	28.8	29.1
Goat	63.1	64.9	66.6
Camels	1.0	1.0	1.0
Horses	0.4	0.4	0.4
Asses	4.8	4.9	4.9
Mules	0.2	0.2	0.2

**Estimated Figures based on inter census growth rate of Livestock Census 1996 & 2006*





Economically Important Livestock Diseases

Cattle & Buffalo

- Foot and Mouth Disease
- Haemorrhagic Septicemia
- Black Quarter
- Anthrax
- Brucellosis
- Leptospirosis
- Infectious Bovine Rhinotracheitis
- Rabies
- Babesiosis
- Trypanosomiasis

Sheep & goat

- Sheep pox
- Goat pox
- PPR
- Bluetongue
- Enterotoxaemia
- JD
- CCPP
- Fasciolosis

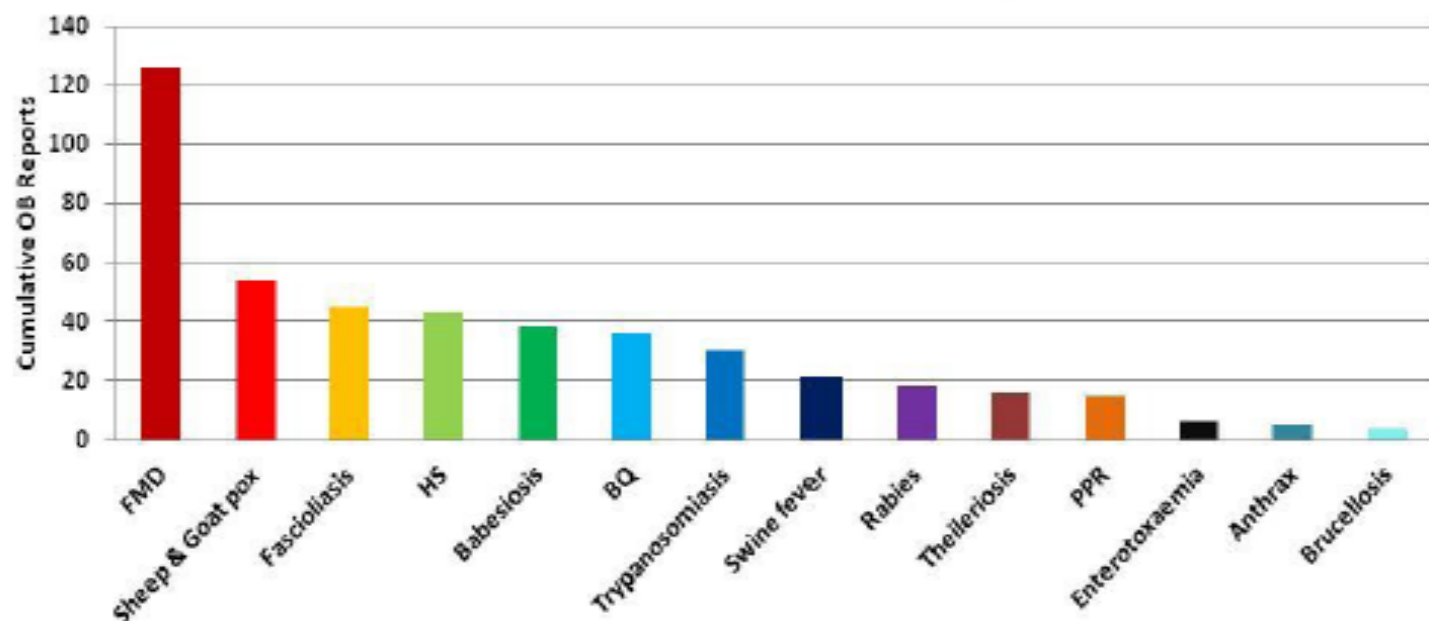
Swine

- CSF
- Porcine reproductive and respiratory syndrome (PRRS)

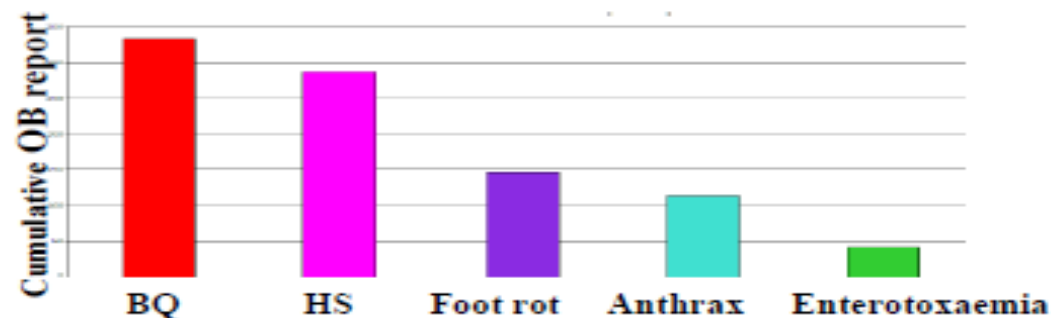
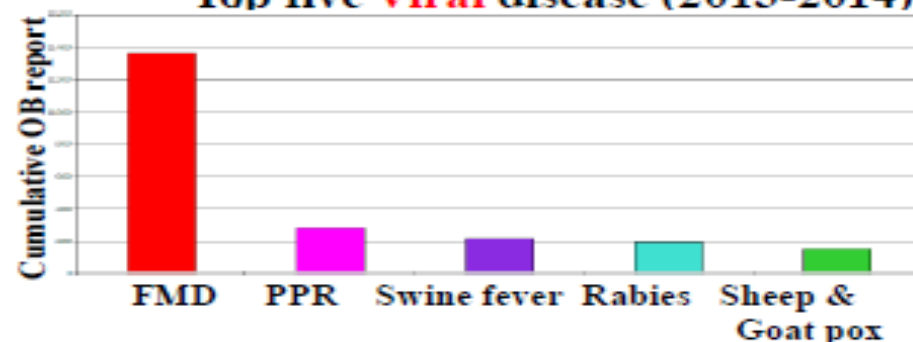
Poultry

- H5N1
- Newcastle Disease
- Mareks Disease
- Chicken Infectious Anaemia (CIA)
- Infectious Bursal Disease (IBD)

DISEASE RANKING (1987 -2014)



Top five Viral disease (2013-2014)



Top five Bacterial disease (2013-2014)

National Agriculture (including Animal) Research System

100 Research National Institute/ centres

17 in Animal Sciences



➤ Goats; buffalos; Sheep and Wool; Cattle; Pig; yak; Mithun; Camel; equines ; Poultry and avian research

➤ Nutrition and Physiology; Epidemiology and disease informatics; Foot and mouth disease; Animal Biotechnology; Animal Genetic Resources

52 agriculture/vet Universities

➤ 16 vet Universities

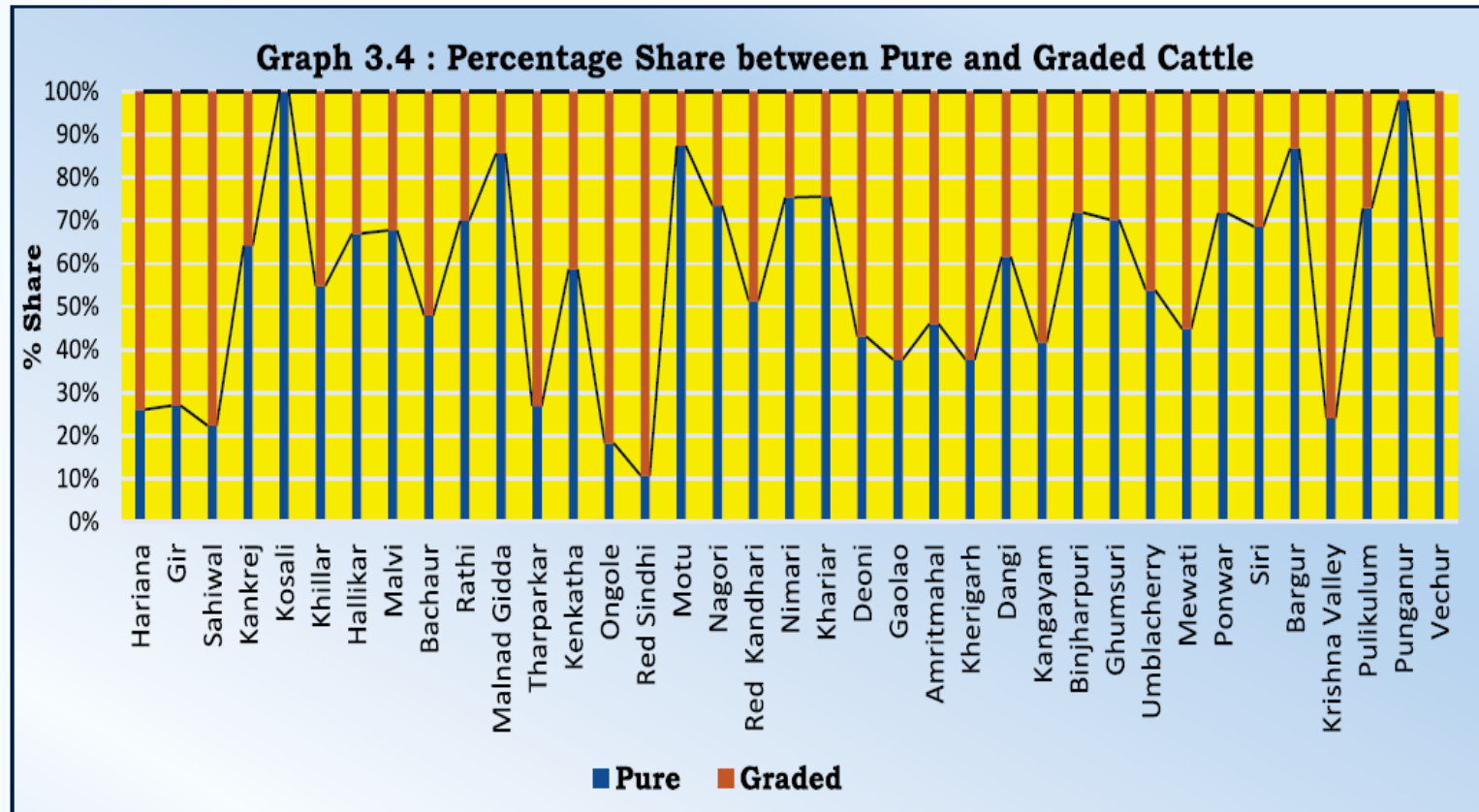
1. Variation in Indian cattle breeds



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in number. In all other breeds major contributions is from graded breeds.



Achievements in the area of cloning in India



Buffalo.

Pratum: first IVF (**in vitro fertilization**) buffalo.

Sampurna: first **cloned** buffalo calf,

Garima: Second cloned buffalo calf through the Advanced **Hand-guided Cloning** Technique was born on June 6, 2009.

Shrestha: On Aug 26, 2010, a cloned calf of male buffalo 'Shrestha' was born from the **somatic cell from the ear of an elite bull**; it has been producing a good-quality of fertile semen

Swarn: On Mar 18, 2013, a clone of male buffalo 'Swarn' born from the **somatic cell of semen**

Purnima: On Sept 6, 2013, a **clone of female buffalo** 'Purnima' born from a high milk-yielding animal; it survived for 21 days before dying



-contd.



Buffalo contd

Mahima: On 25 January 2013 at 1.51 PM by normal parturition a female calf “Mahima” was born from cloned buffalo Garima. In the world, it is the first calf born from cloned buffaloes, produced through hand-guided cloning technique

Gamini: On Aug 22, 2010, a cloned calf of female buffalo ‘Garima-2’ nicknamed Gamini was born from embryonic stem cell; she is the mother of a calf named ‘Mahima



Goat

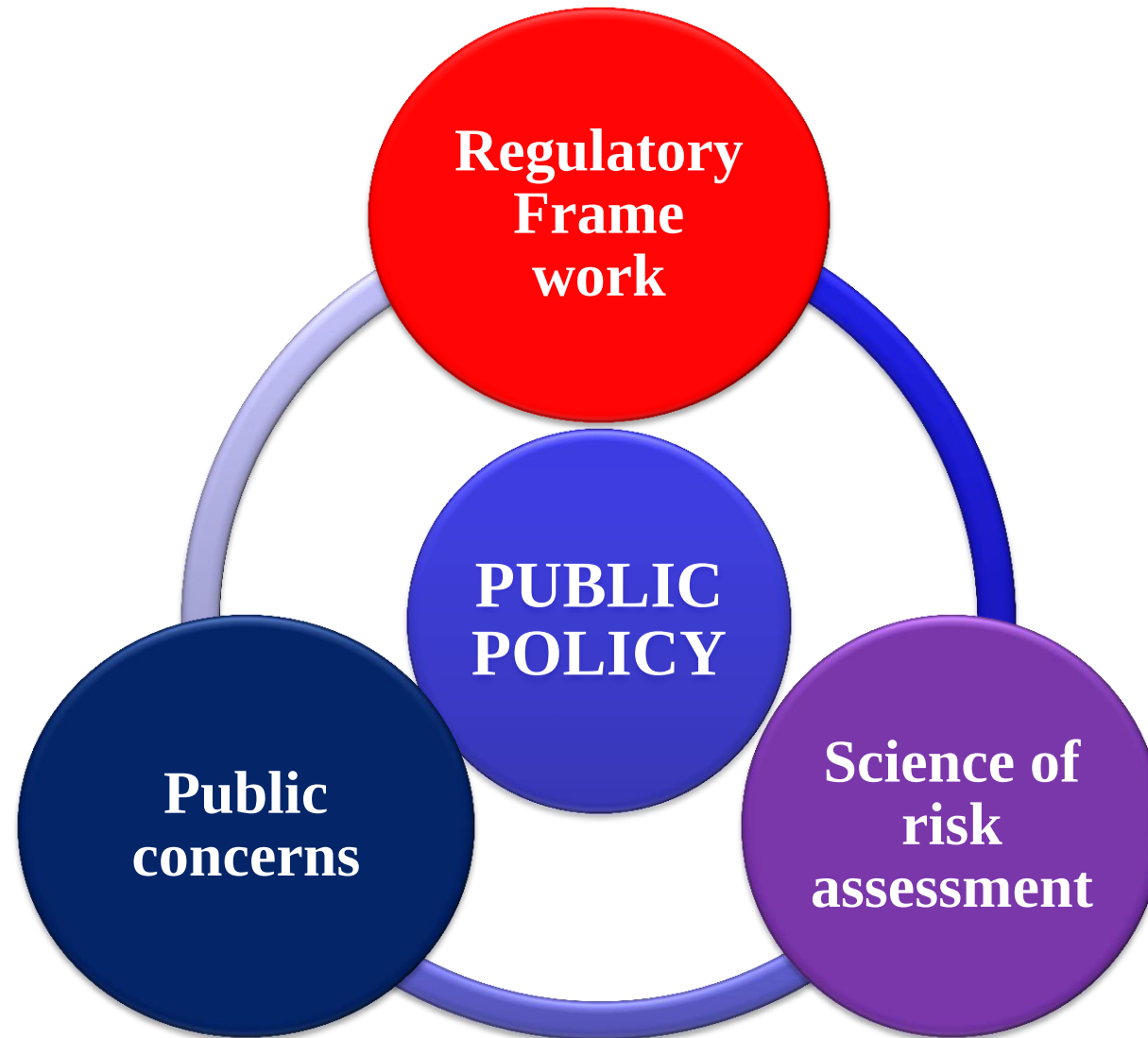
Noori: On 9 March 2012, world's first pashmina goat was born and was named Noori. She is a healthy female and the first pashmina goat to produce by a process of cloning using SCNT

Cattle

First cloned Calf: On Feb 6, 2009, the first cloned calf was born **Lalima:**



CHALLENGES



Projections of Indian population

Years	Indian Population (In Million)
2013	1279.49
2020	133.85
2025	1461.62
2030	1527.65

Source: Faostat, 2015

Supply projections of Livestock products in India The units in million tons for all commodities

Livestock product	Years			
	2020	2025	2030	Growth rate
Milk	175.3	201.6	226.5	2.60
Eggs	3.81	4.31	4.79	2.32
Poultry Meat	4.67	5.43	6.19	2.86
Meat	5.82	8.04	10.9	6.48

CHALLENGES IN 3 DECADES OF EXPERIENCE DEALING WITH GM CROPS

REGULATORY POLICY AND CREDIBILITY

SCIENCE AND PROCESS OF BIOSAFETY ASSESSMENT

EVOLUTION OF ANTI-GM ACTIVISTS AND THEIR AGENDA

CENTER- STATE RELATIONS

PRODUCT STEWARDSHIP AND UNORGANISED SECTOR, CONTAMINATION

PUBLIC ENGAGEMENT PERCEPTION AND RESPONSE

POST-RELEASE MANAGEMENT

INTELLECTUAL PROPERTY, BIODIVERSITY AND LEGAL ISSUES.

DYNAMICS OF INDUSTRY, PRICING AND MARKETS

COURTS – SCIENCE VERSUS PROCESS

INTER-MINISTERIAL COORDINATION

HUMAN RESOURCE DEVELOPMENT

GMO policy dilemma

Promotional

Precautious

Preventive

Prohibitive

India
Pakistan
Bangladesh

Srilanka
Nepal
Bhutan

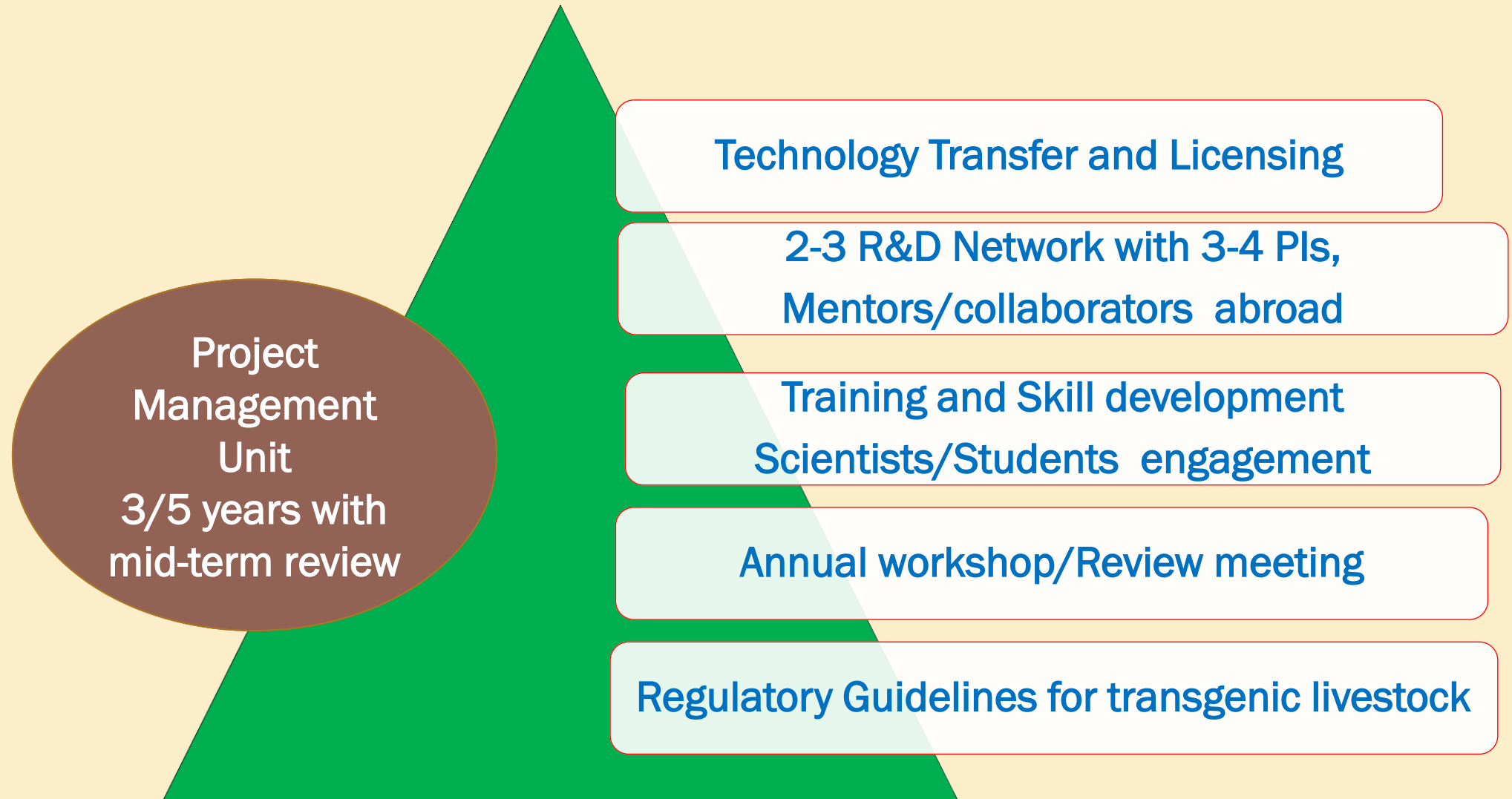


Steps taken towards transgenic animal technology

- A two day Brain Storming Workshop on “Transgenic Livestock: Technologies and Applications” from 19th to 20th February, 2016 was organized at NIVEDI, Bengaluru, India
- Draft regulatory framework has been proposed as- Guidelines for Transgenic animals-2017
- Indian regulatory framework on Genome editing has been proposed in Indian science congress-Jan, 2017



Proposed modalities for transgenic animal technology advancement



Identified research areas for establishment of network program on transgenic livestock



Animals	Research area/Traits	Research Group/Scientists identified/volunteered
Poultry	Biosimilars, Bioreactors, Biobanking, Myostatin, Disease resistance (Influenza)	TRPVB, Chennai, Genomix
Pigs	Biopharming, Myostatin, Biomedical applications, Biobanking	IVRI Izatnagar, NRC Pigs Guwahati
Goat Sheep	Biopharming, Fecundity, Biobanking, Biopharming, Enhancing muscle mass	CSWRI, Avikanagar
Buffalo and Cattle	Comparative genomics, Milk improvement, Disease resistant (Mastitis), Sperm sorting	Tropical Animal Genetics, CIRB, Hisar, NII, Delhi JIVA Biosciences, CCMB

Other Core programmes

- **Extensive phenotyping of Indigenous breeds and their genetics, genome sequencing and genomic breeding;**
- **Animal health and nutrition with special reference to vaccines, diagnostics and feed improvement and additives**
- **Milk and milk quality,**
- **Byproduct utilization and scientific validation**
- **Networking with International Labs**



*Thank
you*

