

# research evidence for policy



Achai cow (local) versus Friesian cow (foreign). Photo: Muhammad Saleem

## Conserving indigenous livestock breeds to benefit mountain smallholders



Case studies featured here were conducted in China, South Africa, and Pakistan.

### Policy Messages

- Indigenous livestock breeds (ILBs) are well-adapted to the poor-quality feed and rugged terrain found in mountain areas. They are resistant to diseases and optimally suited to meet smallholders' needs for milk, meat, wool, draught-power, and cash income from sales.
- Many smallholders can no longer afford to rear breeding males. Policies that promote cross-breeding with foreign breeds to enhance productivity, coupled with inbreeding due to insufficient exchange of breeding males between valleys, are causing genetic dilution of ILBs.
- In-situ conservation of ILBs involving custodian communities, backed up by ex-situ conservation, can halt further dilution and support the sustainable development of ILBs and mountain communities.

- Achai cattle, Azikheli buffalo, and Kari sheep are important indigenous livestock breeds (ILBs) of the Hindu Kush mountains in northern Pakistan. They have an optimal mix of adaptive, reproductive, and productive traits that enable them to meet the multiple needs of their custodian communities.
- Having evolved in harmony with the local topography and climate, these ILBs are key to ensuring efficient use of scarce feed resources and supporting local smallholders' food security. However, inbreeding and cross-breeding are diluting the optimal balance of genetic traits of these breeds. In-situ conservation involving custodian communities is needed to prevent further genetic dilution.

### Food security calls for optimal use of land resources

- The Hindu Kush mountains of northern Pakistan have a harsh climate, and the major proportion of the land is unsuitable for cropping and habitation. The terrain is mostly rugged, with sparse natural vegetation and enormous spatial and temporal variations in the growing season. The communities living in these mountain valleys depend on a variety of extensive livestock production systems for their food security. Besides ensuring food security, extensive livestock production also plays a critical balancing role in the overall land use system and ensures optimal use of scarce feed resources.

ILBs are a crucial component of these extensive livestock production systems. Their specific genetic traits enable them to make efficient use of the scarce and patchy feed resources: their endurance allows them to reach remote, high-altitude pastures in summer, and their small body size keeps their maintenance requirements low and enables them to move with ease across rugged mountainous terrain. In addition, these breeds efficiently convert low-quality forage into products that the local mountain communities need for their food security. Finally, despite the scarce feed supply in these mountain regions, ILBs have higher reproductive rates and a higher milk production to body weight ratio when compared to breeds in plains.

## Featured case studies

### Improvement of southern yellow cattle in China

The southern yellow Qinchuan cattle have a small body size and are well-adapted to the mountainous terrain in many parts of China and Taiwan. The breed has been conserved and further developed from a pure draught breed into a dual-purpose breed by means of artificial insemination and the distribution of selected superior breeding bulls (Qiu Huai et al 1993).

### Conserving the Nguni through utilisation

Until 1990, a cross-breeding programme of the South African government led to a decrease in the number of pure Nguni – a hardy, disease-resistant, and highly fertile indigenous cattle breed. However, the cross-breed failed to perform economically when input supplies broke down in the 1990s due to political changes. This experience has spurred efforts to re-establish the Nguni for efficient livestock production (Geerlings et al 2002).

### Achai Cattle Conservation and Development Programme, Khyber Pakhtunkhwa, Pakistan

Recent NCCR North-South studies have characterised the Achai cattle phenotypically and evaluated its reproductive performance in its home tract in the Hindu Kush mountains of northern Pakistan. Based on these studies, the Livestock and Dairy Development Department of Khyber Pakhtunkhwa has launched the “Achai Cattle Conservation and Development Programme” to conserve the breed in its home tract (Saleem et al 2010; Saleem et al 2012).

- **Adaptive traits are key to efficient use of scarce feed resources**

- ILBs are well-adapted to the harsh environment of the Hindu Kush and Himalaya mountains.
- Compared to high-productivity breeds from the lowlands, they are more resistant to locally prevailing diseases, thus ensuring higher survival rates and minimising expenditures for veterinary services. They can better tolerate the local weather extremes and periods of feed scarcity, and can subsist on low-quality forage.
- Moreover, they are capable of travelling long distances during seasonal transhumance, which ensures efficient use of scarce grazing resources both at high altitudes and in the lower valleys.

- An adaptive trait shared by all ILBs is their small body size. This adaptation to the mountain topography enables them to access steep and rugged terrain, thus optimising the use of patchy grazing resources on mountain slopes. It also reduces their maintenance requirements and enables them to spare a higher proportion of nutrients for efficient reproduction. As a result, a greater proportion of grazing resources is converted into useful livestock products.

- A recent NCCR North-South study shows that the indigenous Achai cattle breed weighs 40% less than the Sahiwal and Red-Sindhi dairy breeds; yet the Achai breed produces only 25% less milk and consumes 40% less feed. Further, the Achai breed produces significantly more offspring. Kari sheep, another ILB, weigh only 14–17 kg and are perfectly adapted to the steep terrain in the narrow valleys of the north-western Hindu Kush; they also have a much higher rate of reproduction over shorter periods. Azikheli, an indigenous breed of buffalo, absorb less heat because of their light brown coat; this reduces their need to wallow in swamps and enables them to graze on high-altitude pastures where water ponds are scarce.

### Reproductive traits are just as important as productive traits

Reproduction is negatively correlated with production. In the developed world, breeders have focused mainly on increasing production, thereby reducing the reproductive capacity of the resulting breeds. By contrast, ILBs of the Hindu Kush and Himalaya mountains of northern Pakistan have retained an optimal balance of productive and reproductive traits that warrants conservation. A recent NCCR North-South study shows that Achai cattle and Azikheli buffalo have significantly higher first-service conception rates (71% and 64%, respectively) than high-productivity breeds. Kari sheep have a gestation period of only 3 months, compared to 5 months for other sheep breeds.

### Multiple traits ensure a balanced performance for mountain livestock keepers

ILBs serve multiple purposes and meet mountain communities’ multiple needs based on an optimal balance of productive, reproductive, and adaptive traits. Achai cows, for example, produce milk for home consumption and offspring for renewing the herd, sale, and occasional slaughtering. Achai bulls are used to plough the narrow terraces on steep mountain slopes. Azikheli buffalo have milk production and growth rates that are comparable to those of other breeds, but are more efficient reproducers. Kari sheep have very fine wool that is ideally suited for handicrafts.

### Main threats to ILBs

Three factors threaten the ideal balance of genetic traits in ILBs.

- **Indiscriminate breeding:** Traditionally, Achai draught bulls were also used for breeding. In the course of mechanisation, many of these bulls were replaced by tractors and have disappeared. As a result, farmers now use for breeding any available bull, regardless of its breed.

- **Cross-breeding:** In 1982, the Livestock and Dairy Development Department of Khyber Pakhtunkhwa – then still called the North-West Frontier Province – began to promote cross-breeding with Friesians in flat irrigated areas and Jerseys in hilly rain-fed areas. The aim was to upgrade so-called nondescript cattle. This programme has since been expanded to cover most of the province.

- **Inbreeding:** Lack of exchange of breeding males between herds has led to continuous use of the same males in the same herds. This phenomenon is accentuated in transhumant farming systems, as isolated herding in remote pastures makes exchange between herds more difficult.



Transhumant herders bringing their herd of Achai cattle to a new grazing area. Photo: Muhammad Saleem

## Definitions

**Genetic traits:** A physical characteristic brought about by the expression of a gene or genes (height, eye colour).

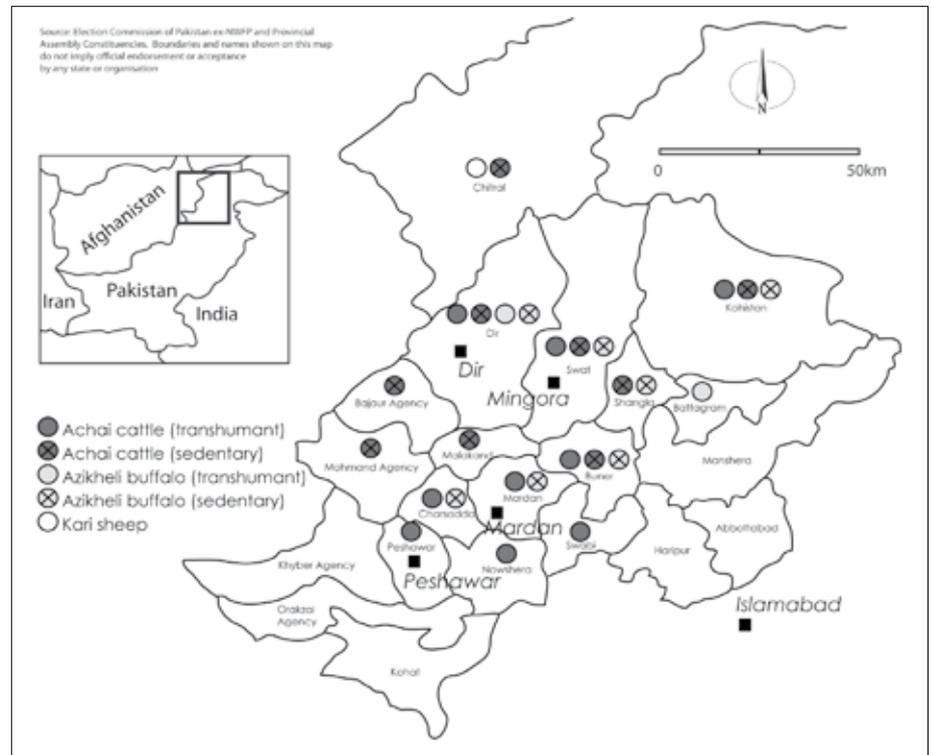
**Gestation period:** Interval from conception to birth.

**In-situ conservation:** Conservation through continued use by livestock keepers in the production system in which the livestock evolved or are now normally found and bred.

**Ex-situ conservation:** Conservation through maintenance of live animal populations outside of the area in which they evolved or are now normally found.

**Maintenance requirement:** The amount of feed required to maintain an animal's body weight and support its necessary metabolic functions, but not production.

**Transhumance:** The seasonal movement of livestock herds between grazing areas. In Khyber Pakhtunkhwa it is between higher-altitude summer and lower-altitude winter grazing areas.



Distribution map of indigenous breeds in Khyber Pakhtunkhwa, northern Pakistan. Map: Inam-Ur-Rahim and Henri Rueff, 2012

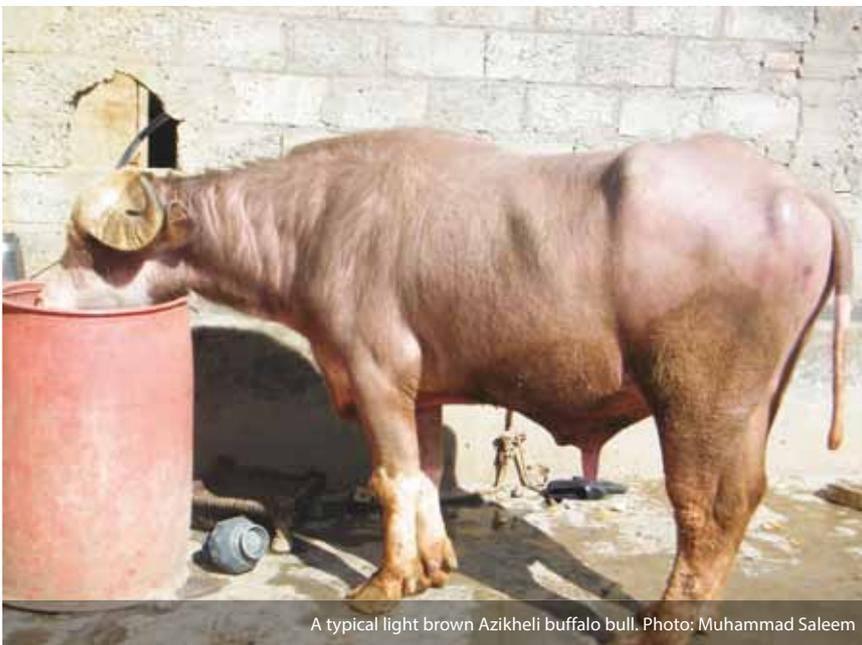
## Identification of key niches for conserving and re-establishing ILBs

The remoteness of mountain valleys in the Hindu Kush is a blessing for ILBs. These remote valleys offer a refuge from cross-breeding and can serve as key niches for in-situ conservation and re-establishment of ILBs. Achai cattle, Azikheli buffalo, and Kari sheep are among the main ILBs of the Hindu Kush mountains that have recently been characterised.

Achai cattle are well-adapted to extensive farming systems and are widespread in the comparably drier, semi-arid western valleys of the Hindu Kush in Khyber Pakhtunkhwa (Malakand and the Federally Administered Tribal Area bordering Afghanistan). Azikheli buffalo are well-adapted to semi-intensive farming systems and are limited to the sub-humid valleys of Hazara and Malakand in the Hindu Kush and Himalaya mountains of Khyber Pakhtunkhwa. Kari sheep are well-adapted to extensive farming in dry and extremely steep mountain terrain and

exist only in the small Lotkoh valley in Chitral, in the northern Hindu Kush.

Achai cattle and Azikheli buffalo are reared under both sedentary and transhumant farming systems, while Kari sheep are kept only in semi-transhumant systems. Other breeds that are indigenous to the mountainous north of Pakistan and remain to be studied include the Gabrali cattle and Ajari goats kept by landless pastoralists.



A typical light brown Azikheli buffalo bull. Photo: Muhammad Saleem



Kari sheep. Photo: Inam-Ur-Rahim



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## Policy implications of NCCR North-South research

### Incorporate conservation of ILBs in the livestock development agenda

The Livestock and Dairy Development Department of Khyber Pakhtunkhwa has recently launched an ILB conservation programme that is limited to Achai cattle. The programme should be extended to include Azikheli buffalo, Kari sheep, Gabrali cattle, and Ajari goats, as well as other ILBs of central and southern Khyber Pakhtunkhwa. Moreover, it should include phenotypic and genotypic characterisation of all ILBs. Trained personnel are needed to identify and tag elite specimens together with the custodian communities for further in-situ and ex-situ conservation.

### Devise zone-wise breeding strategies

Each ILB has its specific home tract. The Livestock and Dairy Development Department needs to do a baseline survey to explore the most suitable zones for different ILBs. Ex-situ and in-situ breeding strategies can then be devised for each zone according to the identified distribution patterns. Cross-breeding should be limited to peri-urban commercial milk and meat farms.

### Recommended conservation activities

To start conservation, the Livestock and Dairy Development Department should:

- Create a conservation centre for the different ILBs on the existing Cattle Breeding and Dairy Farm in Harichand, Charsadda District. This farm is well-suited as a centre for ILB conservation and extension based on either redistribution of breeding males to the custodian communities or artificial insemination.
- Launch regional ILB breeding competitions and fairs to encourage and motivate breeders.
- Promote political support for ILB conservation.
- Launch ILB conservation-awareness campaigns using appropriate mass media to reach relevant custodian communities.

### Further reading

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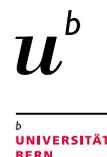
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