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:

High and Low-tech innovations to enhance resilience of small-scale farmers

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0 – VIRTUAL MEETING OF DRYLANDS EXPERTS

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Introduction

- **Drylands Context:** characterized by land use systems across the desert, arid, semi-arid and dry sub-humid agro-ecologies.
- Communities living in these "difficult" environments have developed resilient farming systems comprising *inter alia*:
  - Use of grasslands that support almost half of livestock globally;
  - niche crop/commodity production systems;
  - forestry/agroforestry – to sustain highly adapted livelihood systems.
- Dryland agriculture constitutes >**44% of global agricultural production** and contains significant agro-bio-diversity. And drylands **contribute to 50% of the livestock production**, globally.
- Some **33 % of the global human population and 50%** of a range of livestock production systems including Pastoralists.

Challenges for Dryland farming systems:

- Plant and animal health - crucial for the production of food for human consumption.
- Plant pests and diseases are important threats also to dryland farming community-livelihoods especially in developing countries where agriculture (including livestock) is the main source of income.
- A very high proportion of agriculture production is lost annually due to destructive pests and diseases – (the latest Desert locust plague).
- The effects of Zoonotic diseases - the COVID19 Pandemic and the new normal

The COVID 19 Pandemic - impacting on Food Systems

The negative effects of the Pandemic are not confined to the drylands:

- **Supply Chain disruptions** due to restricted trade flows in food systems with high dependency on imports (for equipment such as for cooling meats, for inputs such as feed, or for food products themselves – import or export dependencies).
- **Post harvest food processing** is interrupted or in dis-array due to labour movement restrictions, increased risk for spreading diseases at the facilities or via products leaving from them;
- **Market failure -** for small retail operators and those heavily dependent in supplying them, due to severe movement restrictions of consumers - lack of e-commerce linkages (market diversification)

- **The challenge for the coming cropping seasons – a downward spiral**:

- **Lack of or insufficient number of workers** for cultivation and agricultural production - may negatively affect timing of planting and subsequent harvests, similarly for food processing (Source FAO)

Overcoming Challenges & Opportunities

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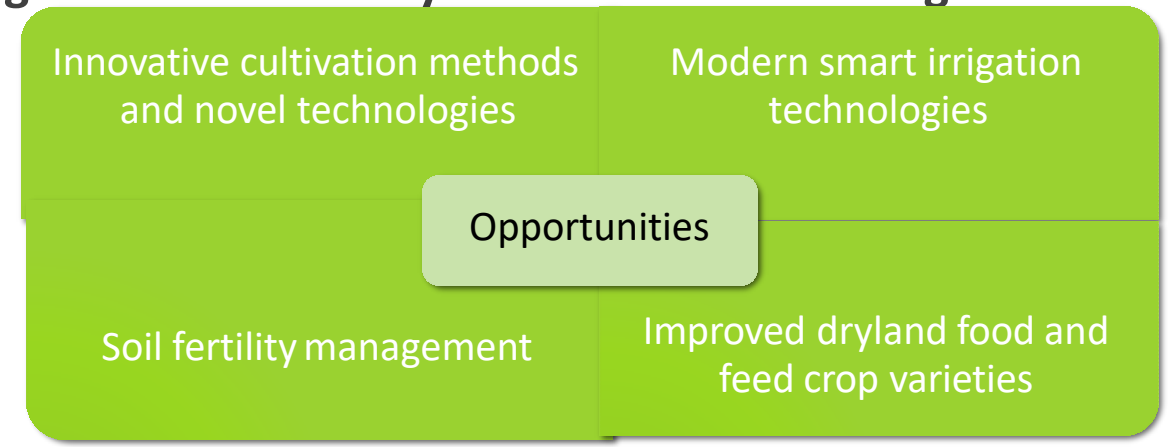
- **Traditional sustainable resource management** systems are breaking down: demographic pressures; climate change etc.
- **Capacity building of Weak institutions**: lack of agricultural advisory services and so, poor access to knowledge of cutting-edge technologies & new practices /techniques for marginal farmers (with no decision tools).
- **Sustainability of agricultural production systems** = highly judicious use of resources: knowledge-intensive use of biomass; soil fertility management, efficient water use technologies, and context-appropriate production and protection measures.
- **Agriculture in the drylands can thrive through:**



A holistic approach to Food Systems for sustainable production in drylands in order to deliver on SDG 1& 2 with links to the entire 2030 Agenda.

What can we learn from IFAD's grant portfolio?

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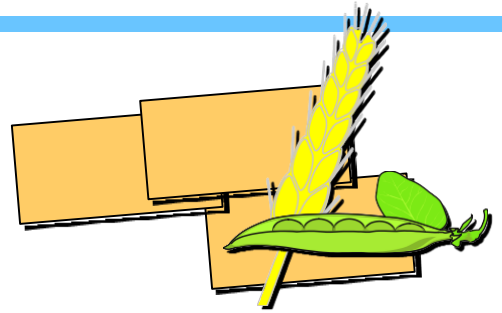
Target groups

- The Fund's target groups and their household food-security strategies predominantly located in harsh, marginalised agro-ecologies;

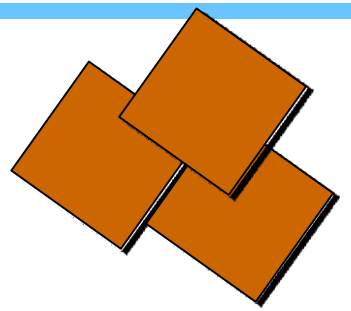
Tailored Investments

- Over the past four decades IFAD has invested more than USD 2 billion in the development of best-bet technologies with particular reference to those in remote, risk-prone and marginal areas and the above-mentioned target groups.

Some successful Low –tech Options

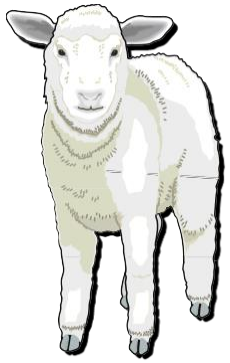


On-farm Feed Production

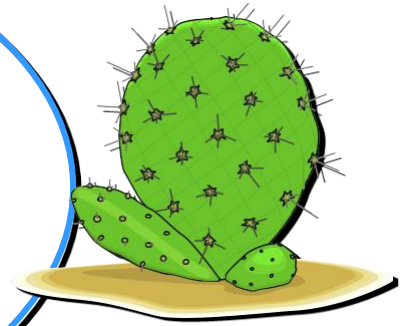


By-products Feed Blocks

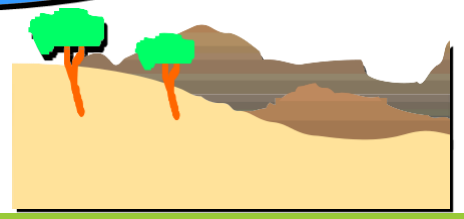
Barley Production



Small Ruminant Husbandry & Management



Cactus & Fodder Shrubs



Agroforestry; Natural Pastures Enhancement & Rangeland Management

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Alternatives for Smallholder Irrigation

Community Level Tools for decision making and implementation should include:

- ✓sustainable, healthy, and ecologically sound management of smallholder irrigation
- ✓Smallholders using manpower or pumps
- ✓Small multi-purpose reservoirs
- ✓Larger government sponsored smallholder schemes

Atriplex/barley alley cropping

Transformed Agricultural landscapes

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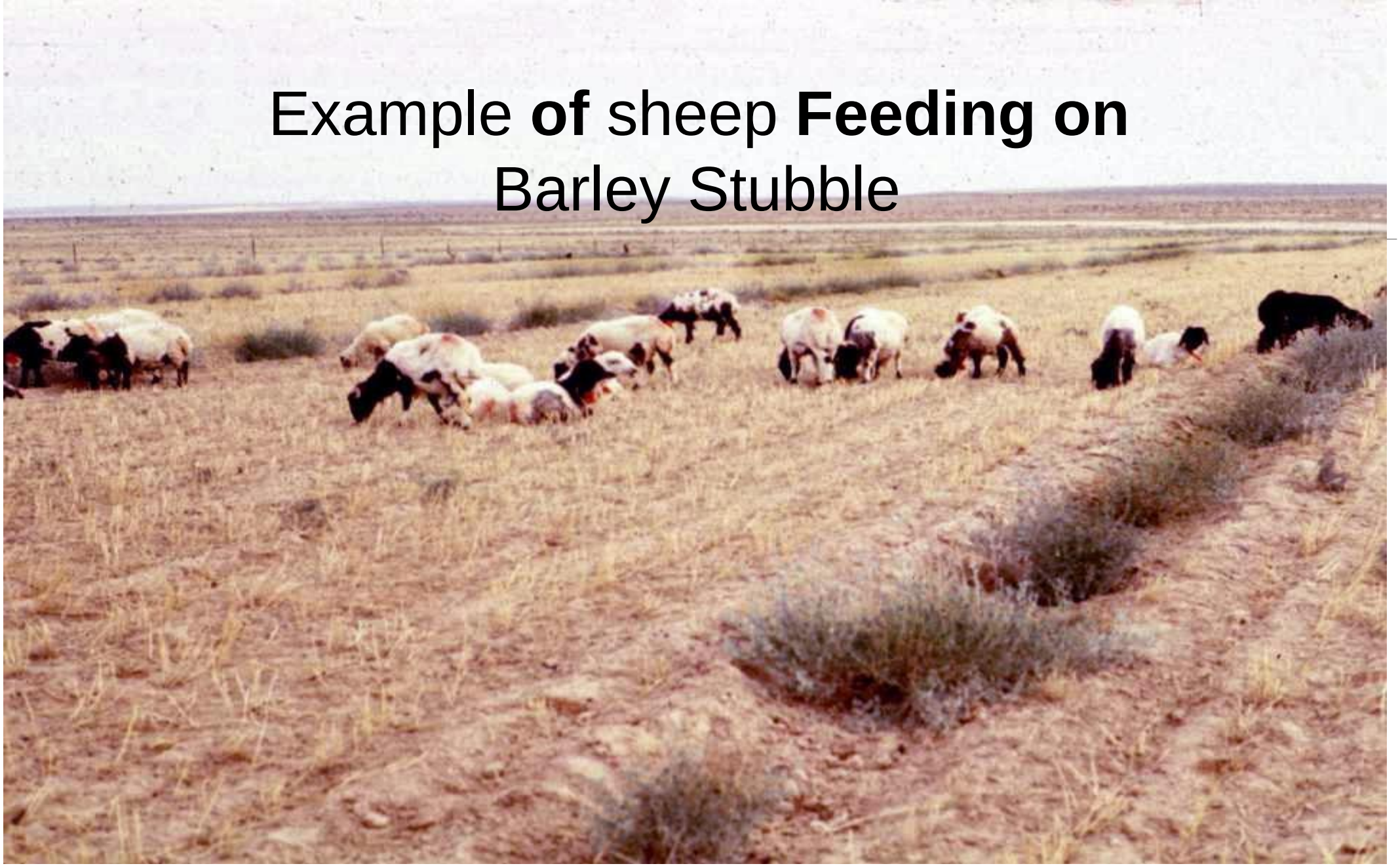
Five million hectares of millet production in Faidherbia parklands in Niger: A transformed agricultural landscape


Aerial view of a parkland dominated by Faidherbia in Niger

Adoption of high impact Forage Legumes

- Promotion of rotations of barley with forage legumes (Vicia and Lathyus spp.)
- Improved breeds of small ruminants – better adaptability and more efficient feed conversion

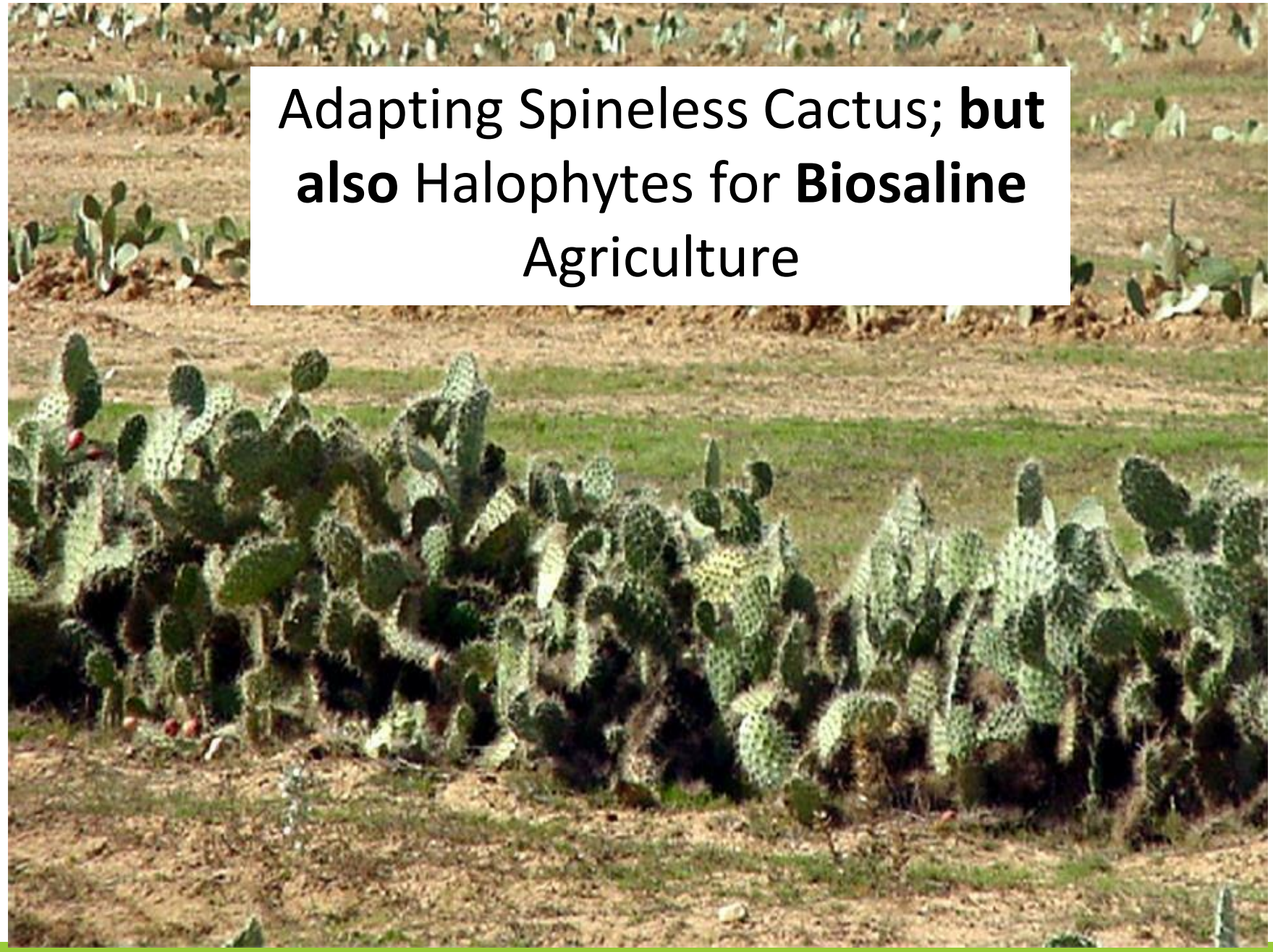
Example **of** sheep **Feeding on** Barley Stubble



Innovations in breeding

Efficient feed conversion

EARLY WEANING



Adapting Spineless Cactus; **but also** Halophytes for **Biosaline** Agriculture

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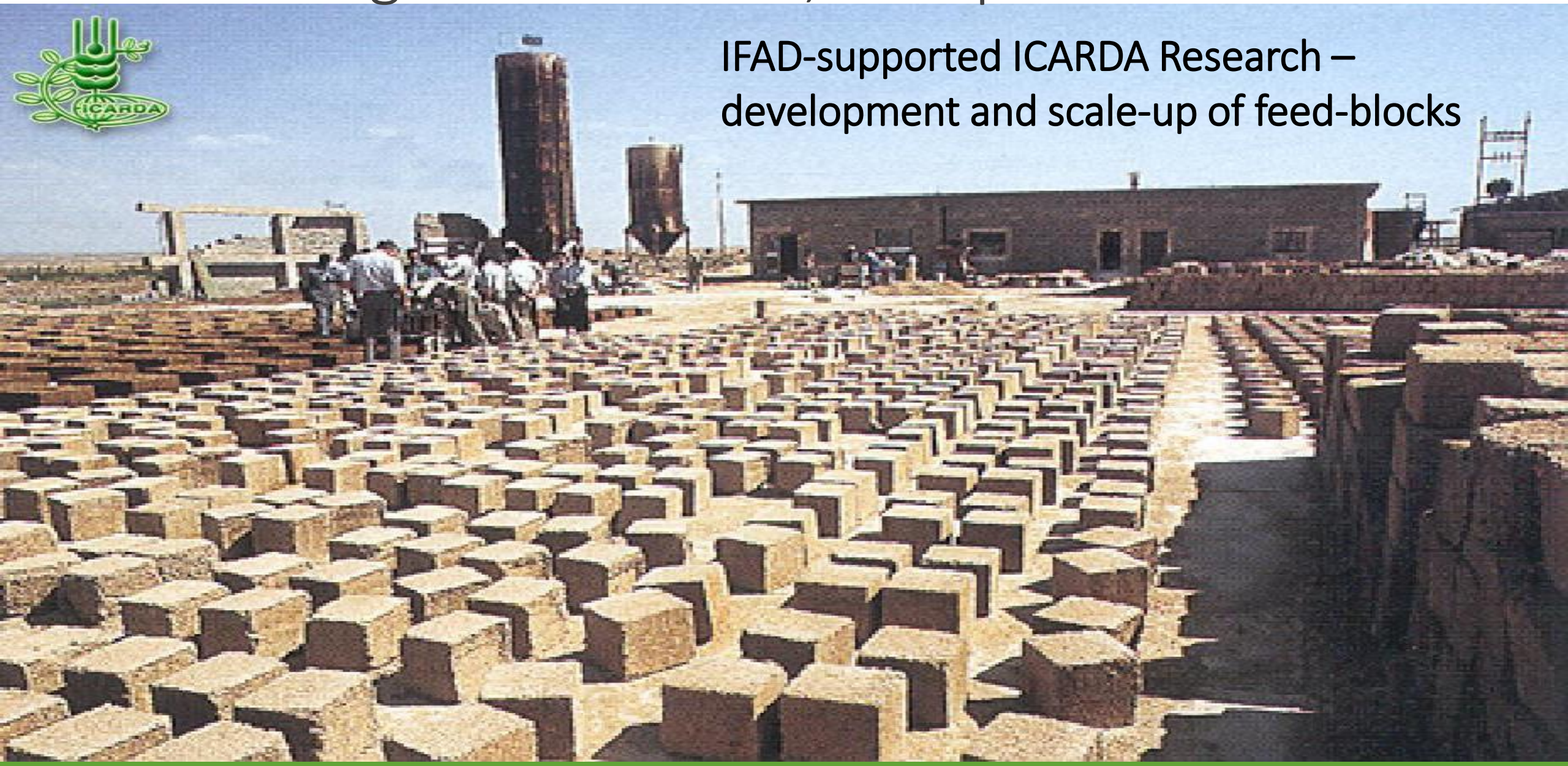
Protection technologies in desert conditions with net-houses

- **With IFAD and AFESD support ICARDA and NARS have developed net houses** throughout the Arabian Peninsula since 2008 (Arabian Peninsula Regional Programme).
- Soil-less agriculture (Hydroponics) in UAE.
- Protected agriculture is very promising (e.g, Afghanistan, Yemen): **Net-houses allow vegetable production in desert conditions 8-9 months of the year with high yield**. Net benefits same as cooled greenhouses in 12 months due to energy savings.

Technologies for storable, transportable feed



The promise of new technologies for sustainable food systems in the drylands

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Fourth industrial revolution technologies – examples:

- Precision agriculture using AI
- Remote sensing (satellite imagery & ground truthing)
- Drones for better mapping soil structure
- "Good" biotechnologies - molecular markers (breeding efficiency)
- Gene-editing techniques

And much more……

Improving Resilience in the Drylands – Towards a food systems approach

- **Overcoming new constraints to Food systems –**
- **The need to place new technologies within their appropriate operational context (adoptability)**
- **Need to look beyond the farm - rural systems-urban links;**
- **Input- and Output-Markets**
- **Removing disruptions and improving access –**
  - the role of Labour markets and value-chains;
- **an enabling institutional and policy context;**
- **And Big Data (also for evidence-based policies)..**

- ***And more…..***

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Thank you!

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