Use of locusts and grasshoppers as feed and food: turning threats into opportunities

Harinder Mak

kar, Valérie Heuzé, Gilles Tran

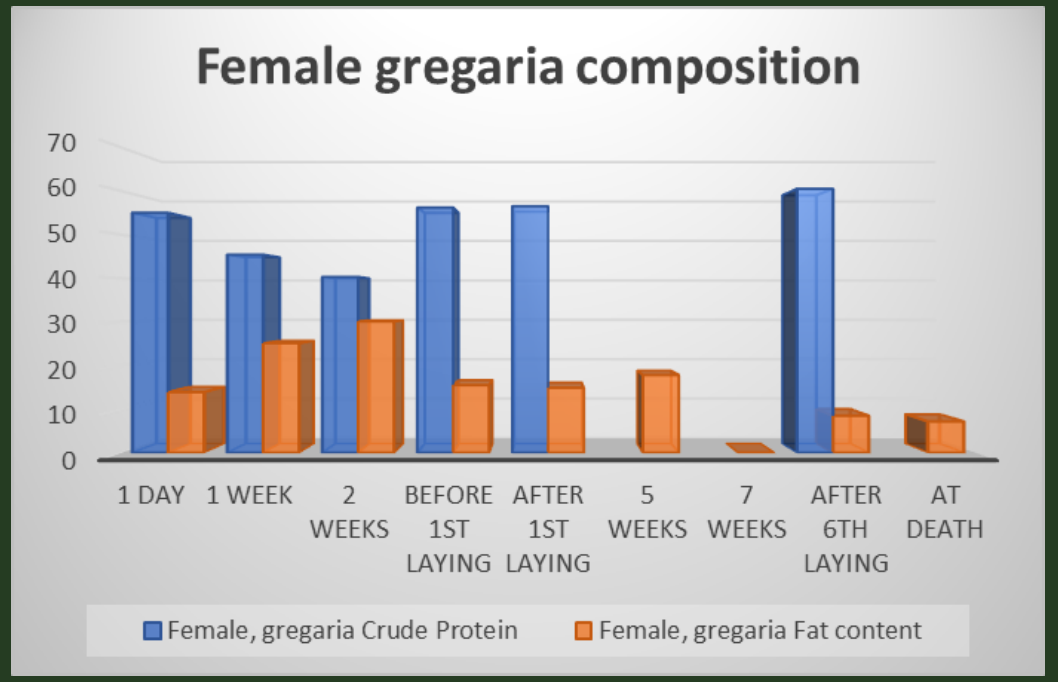
Threats of locusts swarms

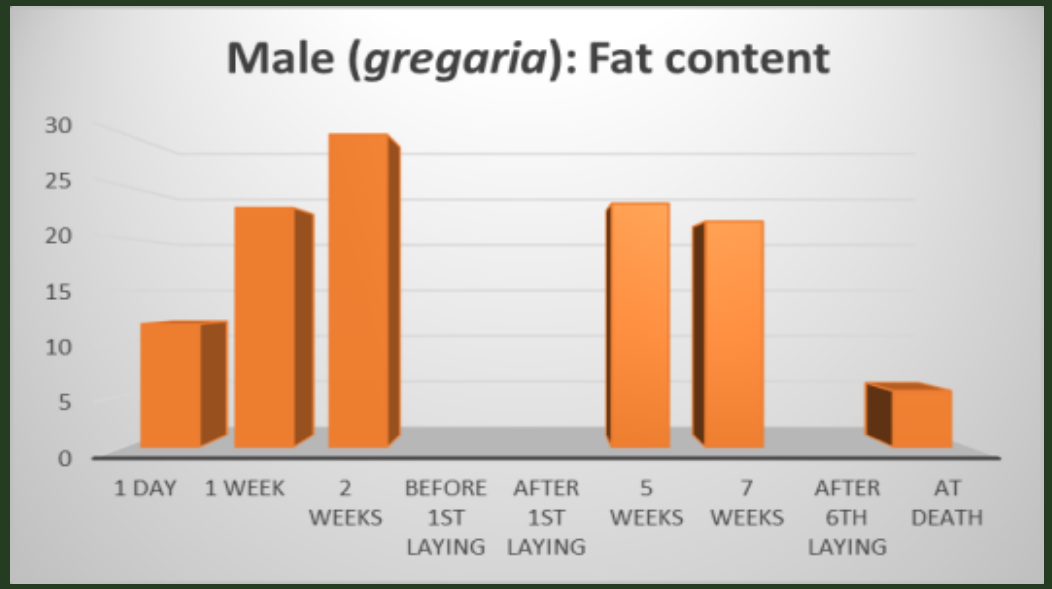
- As large as Paris, up to 80 million locusts (in gregaria stage)/km²
- Ethiopia :
  - Loss of 356,000 tons cereal crops
  - Pasture reduction by 40 %
  - Almost one million people included in the emergency food assistance plans.
- Kenya:
  - Pasture reduction by 30%
  - Loss of feeds and livelihoods

Locusts and grasshoppers as feed: composition

	DRY MATTER	CRUDE PROTEIN (DM basis)	FAT (DM basis)	CRUDE FIBRE (DM basis)	ASH (DM basis)
Locusts and grasshoppers	25-35%	50-65%	<10% to >30%	8-15% (chitin included)	0.7-11.4%
Fishmeal	92,1%	65,2%	9,2%	0	16,8%
Soybean meal	93,2%	43,8%	8,9%	6%	6,1%

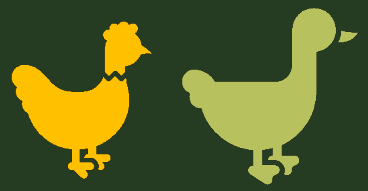
Locusts and grasshoppers : protein and fat variability over *gregaria* stages





Nutritional value in animal feeding?

- Could replace part of the protein in the diet of



Type of animal	Free-range chickens & ducks	Broilers	Japanese quail
Country	China, Philippines, Tibet	Philippines, Nigeria, China, Tibet	India
Results:	animal welfare, lower weights but enhanced meat quality	FM replacer : 20-40%; 50% (1,7% dietary)=> + Weight; improved FCR 2,5-7,5% (dietary)=> - weights	FM replacer: 50% => + fecundity
Conclusion	Consider having giant bird flocks	Cheap and suitable	suitable

- Lower performance at increasing rates of inclusion (aa profile; over-estimated protein content)

Nutritional value in animal feeding?

Animal	African catfish	Nile tilapia
Country	Nigeria, India	Nigeria
Results	25% dietary protein or 25% FM =>slight reduction of the gills Reduced ovarian steroidogenesis	25% FM replacer => No adverse effect
Conclusion	May reduce fertility	Can be fed to Nile tilapia

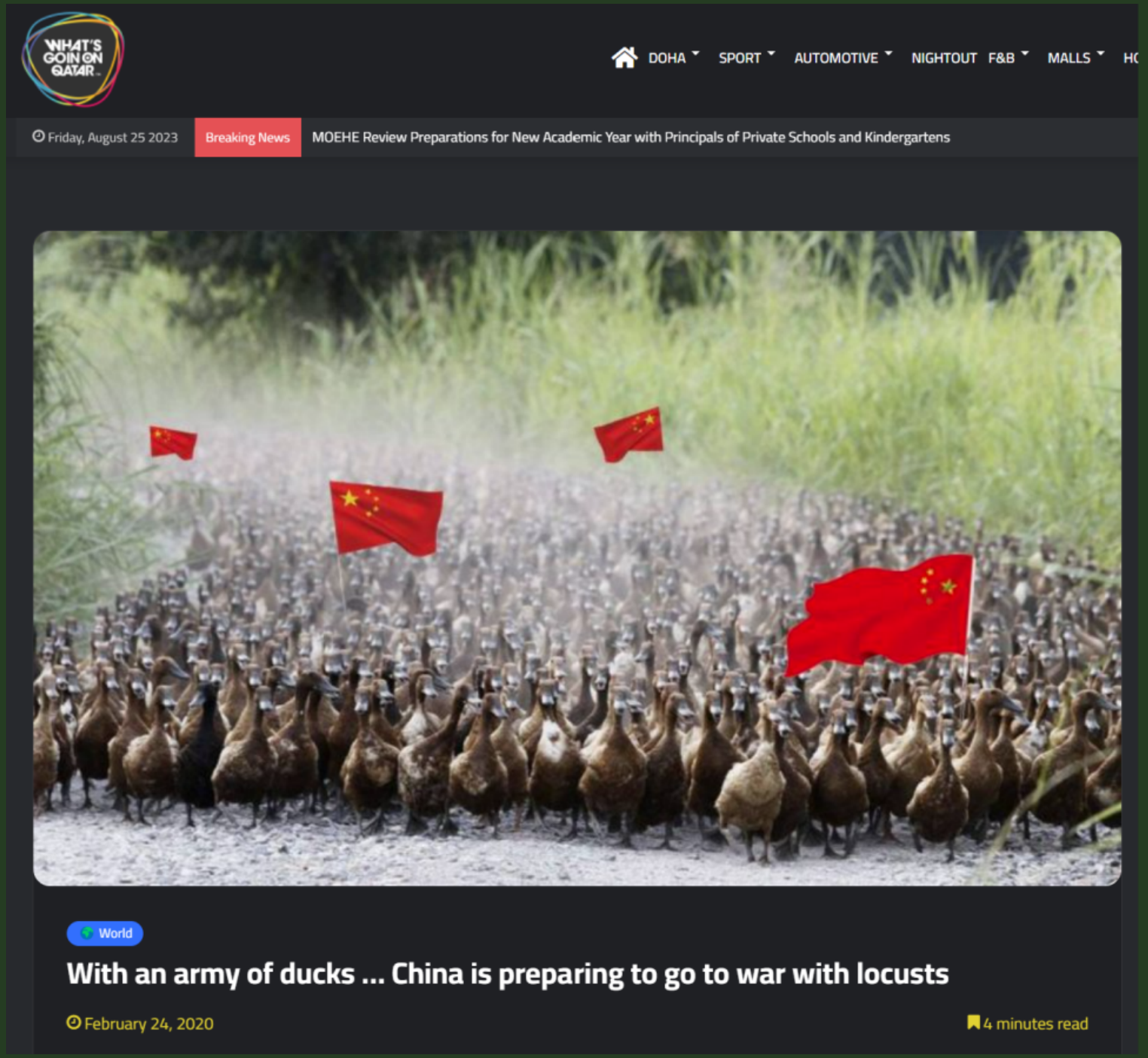
...ried red locusts => fishy taint even with removal 3 weeks before slaughter

The arts of locusts and grasshoppers hunting

- Direct predation
- Manual catching
- Static traps
- Mobile traps

Direct predation

Cited in many journals, videos



Manual catching in Mexico

Photo credit: C.L.R. Payne, All rights reserved.

Photo credit: Joaquín Murguía-González, CC BY-NC

Rope-catching in Vietnam

Photo credit: Bao Anh Vietnam, kind permission, All rights reserved

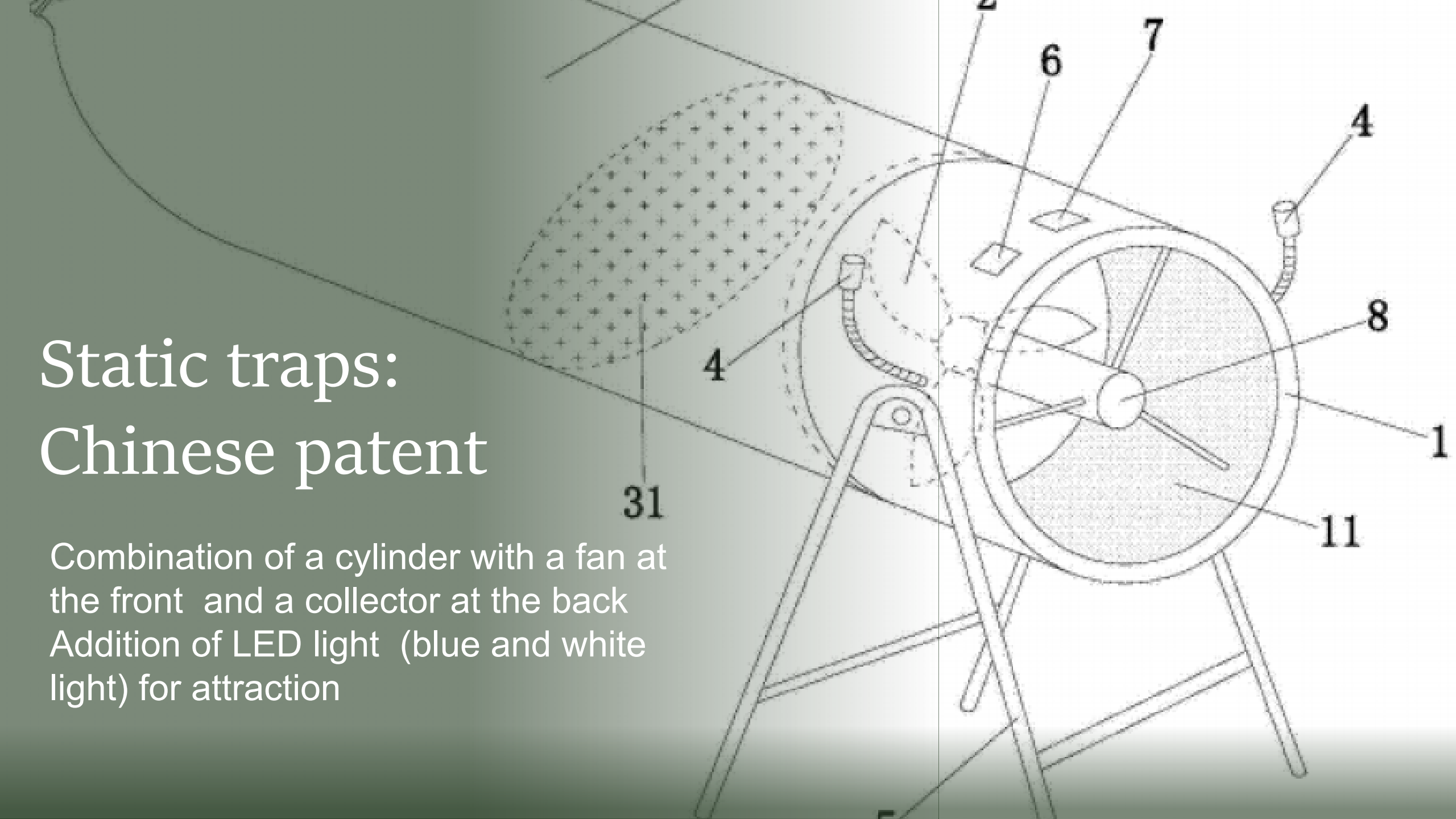
Static traps

Phototactism and air disturbance

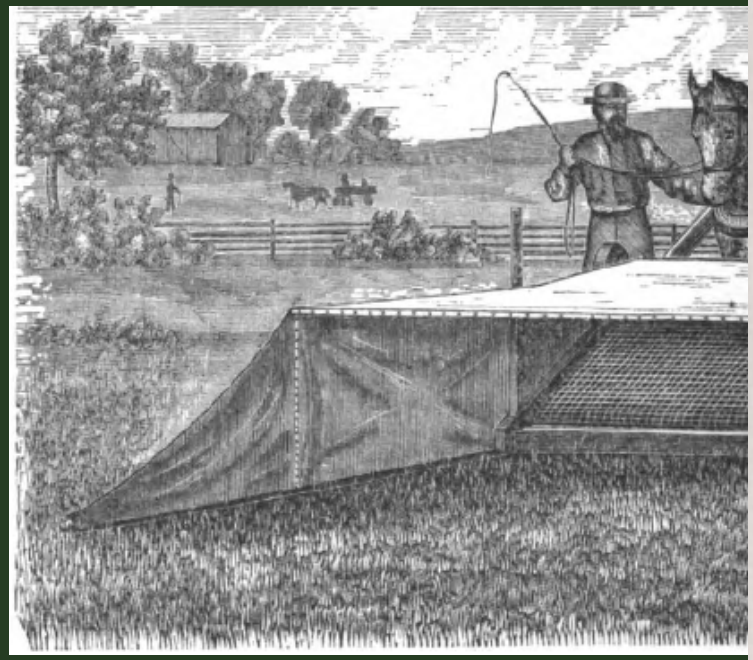
Photo credit: Patience Atuhaire, BBC, kind permissions, All rights reserved

Static traps: Chinese patent

Combination of a cylinder with a fan at the front and a collector at the back
Addition of LED light (blue and white light) for attraction

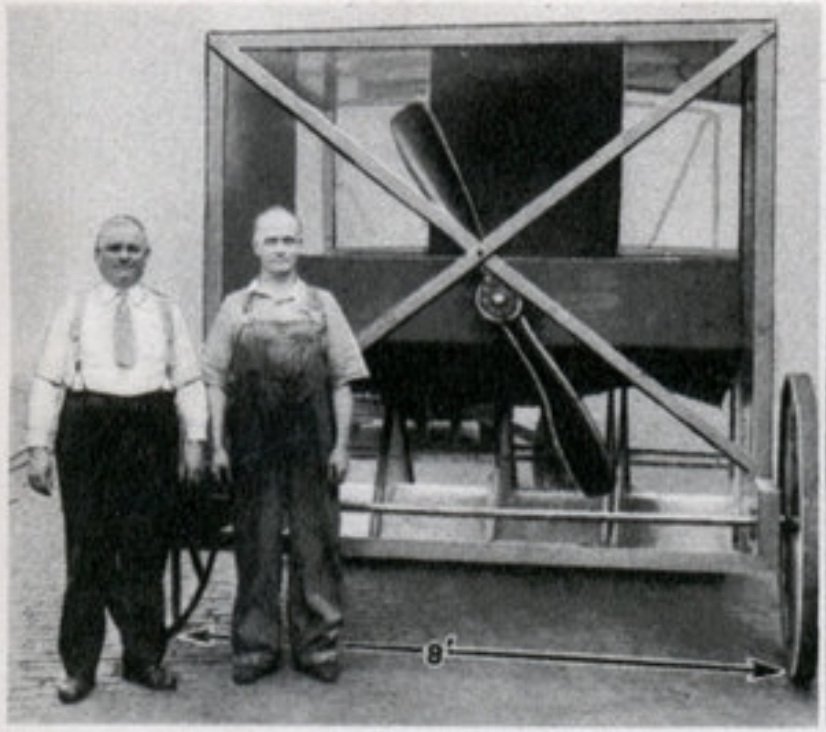


Mobile traps:



The Flory locust-machine.
Credit: US entomological Commiss

Grasshopper Death Machine Fights Farmers' Insect Menace



This 'hopper-killing device is the invention of Joseph Dillman, North Dakota farmer, and Henry Olson, of Minneapolis, who are shown at the left above. Note the four suspended wire cages, at right, into which the dead insects are blown and collected.

FOR seven years Joseph Dillman, wheat farmer of Strasberg, N. D., stood by helplessly and watched huge swarms of grasshoppers descend upon his grain fields and lay waste to his crops. Then this practical-minded person set about to devise a death machine which would put an end to the destructive insect plagues.

He built a three-wheeled device, screened on all sides except the front. Inside of the box he mounted a propeller, which not only drives the machine forward but sucks the grasshoppers into the trap. The force of the air is claimed to be so great that it will pulverize the bugs, sifting them through the ¼-inch mesh.

Today: back to 19th century inspiration

- New patents based on this device but mounted on motorbikes
- Suitable for a wide range of situations
- Cheap, and do not kill the insects

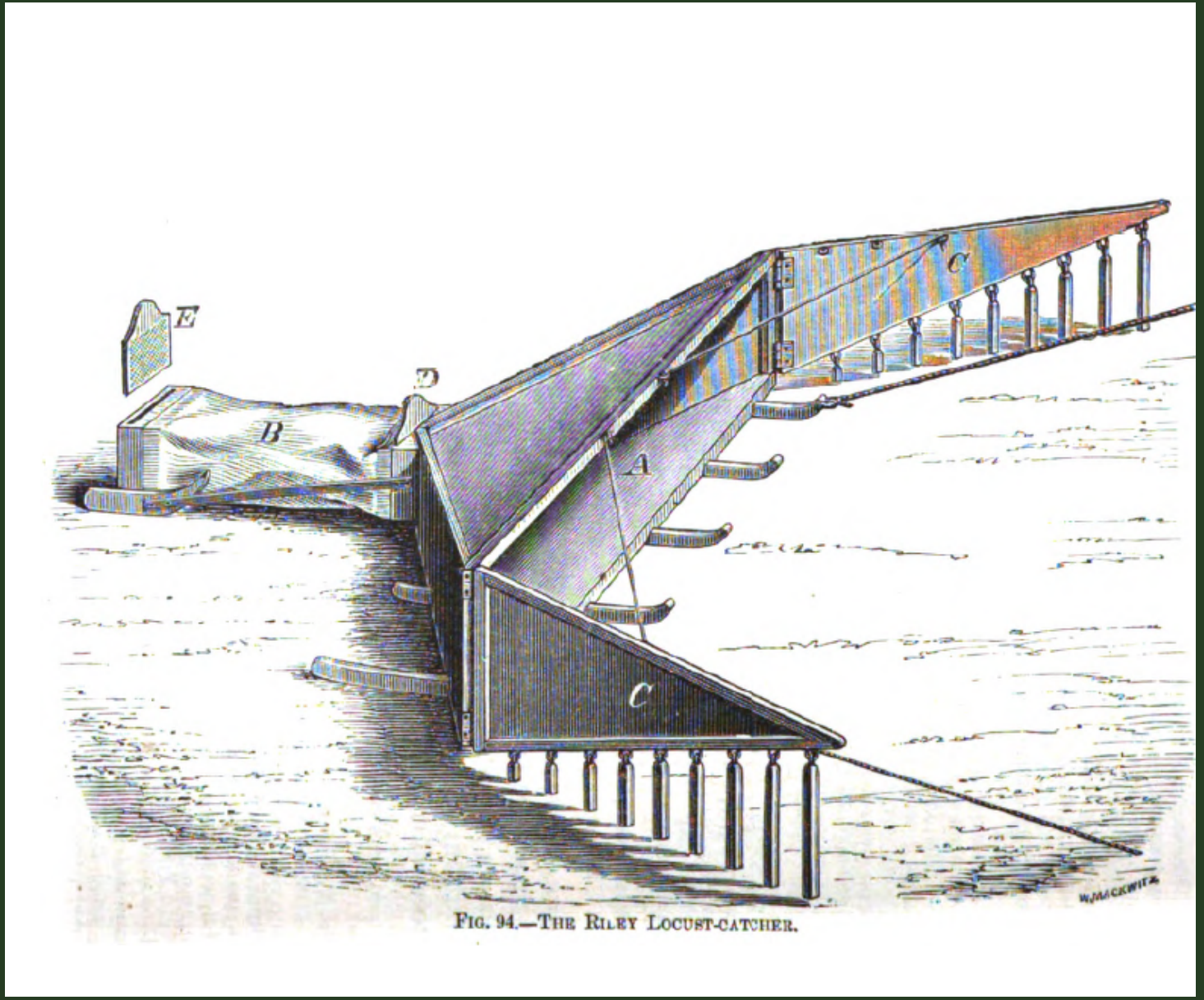


FIG. 94.—THE RILEY LOCUST-CATCHER.

Rearing locusts and grasshoppers for feed?

Which diet?

Foliages => OK but supply issue

Dry diets:

Starchy ; starchy + carrot; Protein +fibre => flat FI, poor WG, poor performance

Protein + carrot ; Protein +Carrot+Fibre => increased FI, good WG, excellent FCR

Conclusion : Balanced diet (energy, protein, fibre) = good growth, balanced composition, protein makes protein

Constraints with locusts & grasshoppers as food and feed

- Pesticides
- Programmes against locust plague: high risk of contamination and decline of human consumption
- Contaminants
  - Lead contamination in Mexico (silver mines)
- Spines
  - Intestinal disorders
- Processing and storage
  - Heat and pressure during processing reduce bacterial contamination
  - Storage must be clean, free of moisture and contamination

Conclusion and way forward

- Harvesting L & G is an opportunity for small holders to provide better diet to their animals
- Beware of pesticides ⚠
- Integrated control approach => less pesticides
- Knowledge dissemination could help mitigating this plague (capacity building)

Thank you for your attention and find more information about insects as feed on **Feedipedia**