Introduction to Drones in Agriculture

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Outline

- Introduction to drones
- Drone use in agriculture
- The drone market
- Benefits of drones
- Drawbacks of drones
- Summary

N EXTENSION

Drone, UAV, or UAS?

- Drones are officially known as Unmanned Aerial Vehicles (UAVs) or Unmanned Aerial Systems (UASs)
- Variety of types
  - Multirotor drones
  - Fixed wing drones
  - Single rotor drones

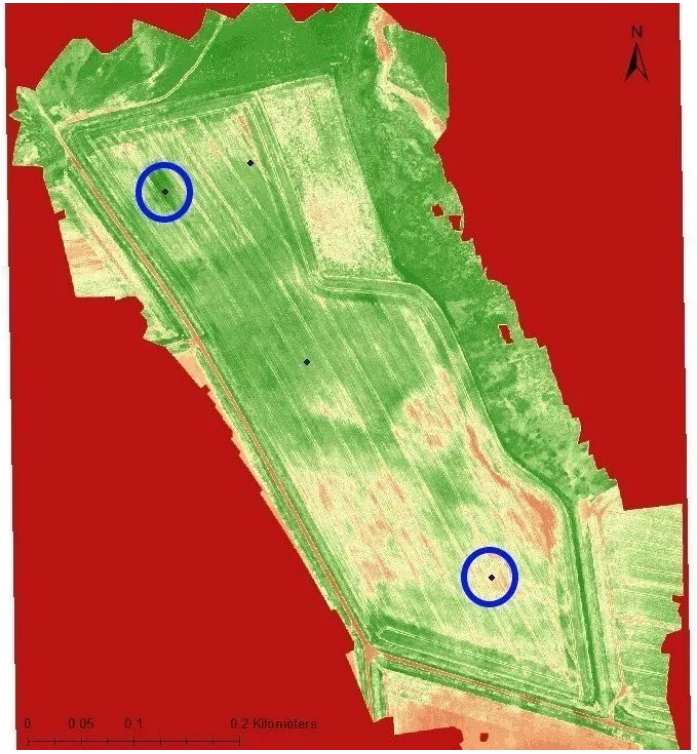
EXTENSION

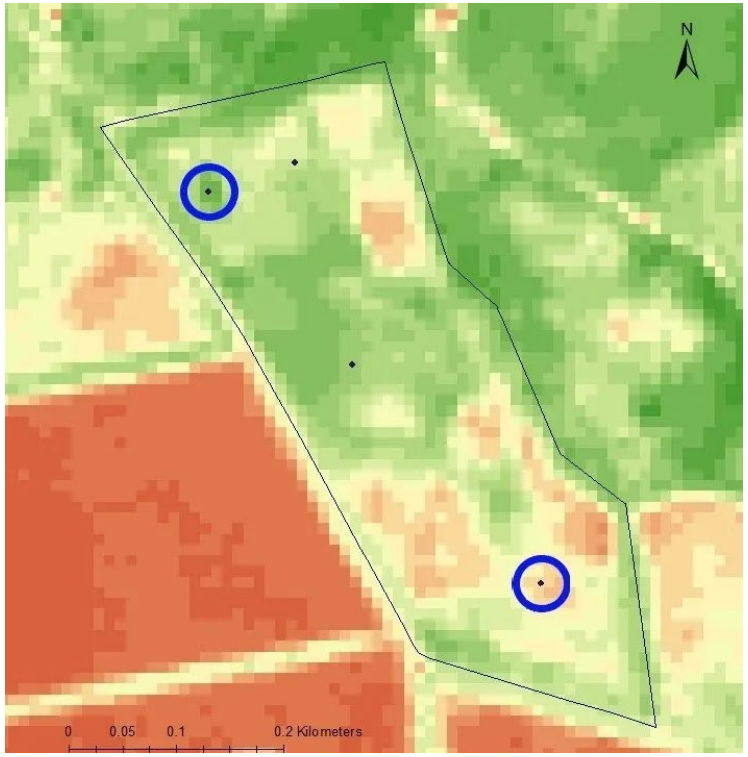
How are drones used in Agriculture?

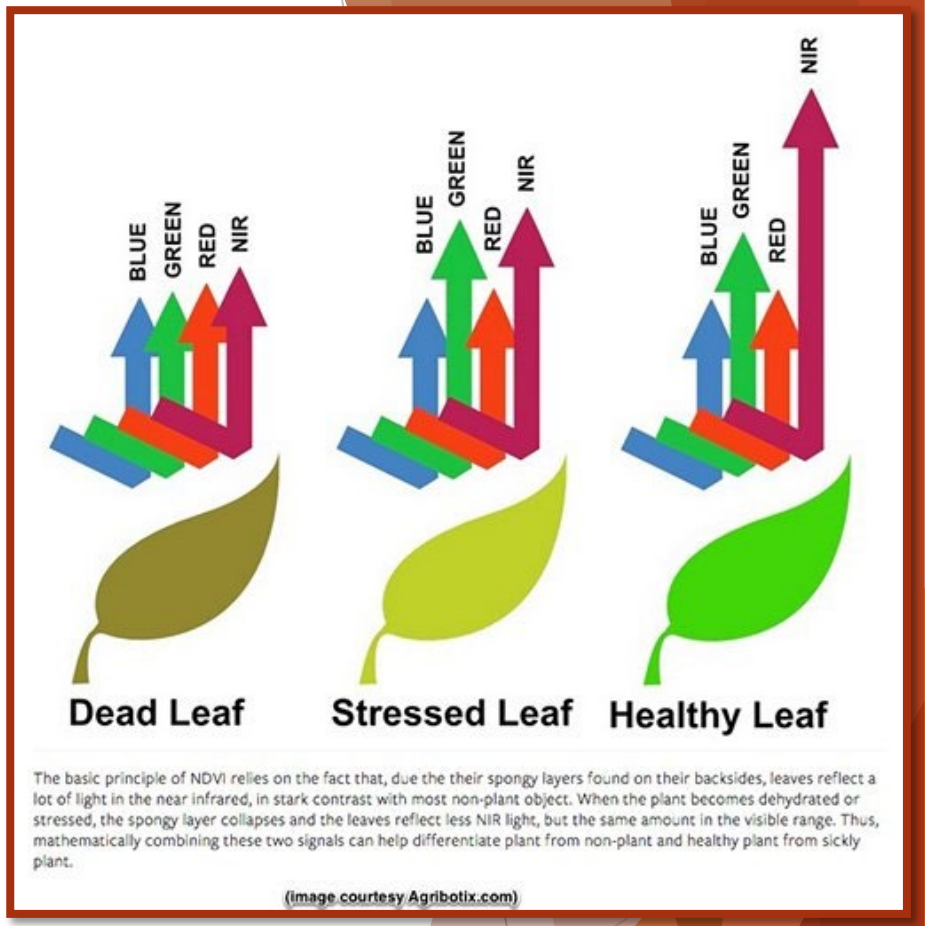
- Imaging
  - NDVI (plant density) and NDRE (plant stress)
  - Scouting for insects, weeds, and disease
  - Conducting stand counts
  - Monitoring cattle
  - Inspecting pivots, fences, etc.
- Product application
  - Chemical spraying
  - Release of biological control agents
  - Seeding cover crops

Imaging

- NDVI (Normalized Difference Vegetation Index) – Density & Nutrient status
- NDRE (Normalized Difference Red Edge) - Stress
- High resolution sensors







EXTENSION


AGRICULTURE

Crop Scouting - Taranis

Early weed detection in sugar beets – Scottsbluff, NE

Stand count – Scottsbluff, NE

EXTENSION

Crop Scouting - Taranis

Grasshopper & feeding damage – Scottsbluff, NE

Disease detection - Nebraska

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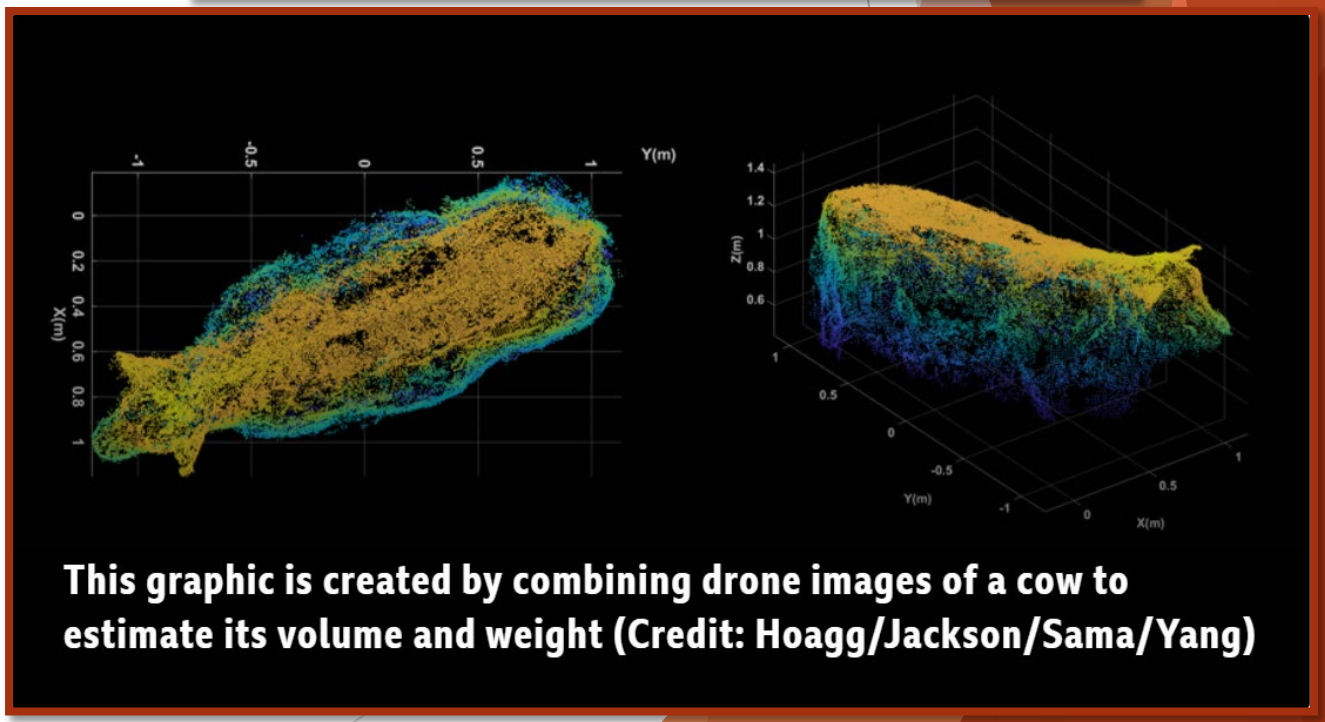
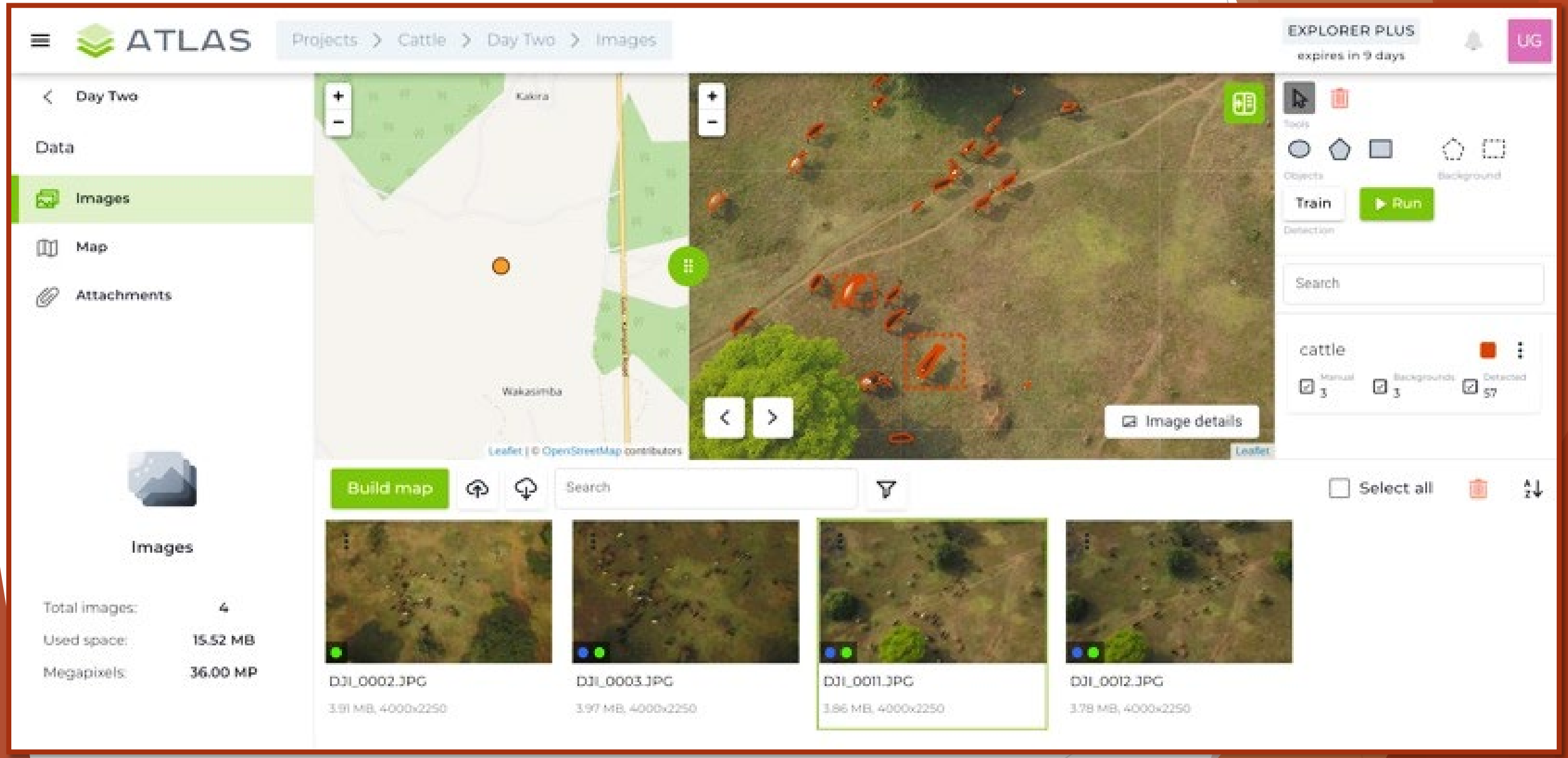
Cattle Management with Drones

- Thermal imaging
- Herd inspection
  - Estrous checks/Calving season
  - Health checks
  - Weather
- Pasture inspection
  - Water sources
  - Fencing
- Herding



This graphic is created by combining drone images of a cow to estimate its volume and weight (Credit: Hoagg/Jackson/Sama/Yang)


ATLAS
Projects > Cattle > Day Two > Images
EXPLORER PLUS
expires in 9 days
UG
Day Two
Data
Images
Map
Attachments
Kakira
Wakasimba
Leaflet | © OpenStreetMap contributors
Image details
Leaflet
Tools
Objects
Background
Train
Run
Detection
Search
cattle
Manual 3
Backgrounds 3
Detected 57
Images
Total images: 4
Used space: 15.52 MB
Megapixels: 36.00 MP
Build map
Search
Select all
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3.91 MB, 4000x2250
DJI_0003.JPG
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DJI_0011.JPG
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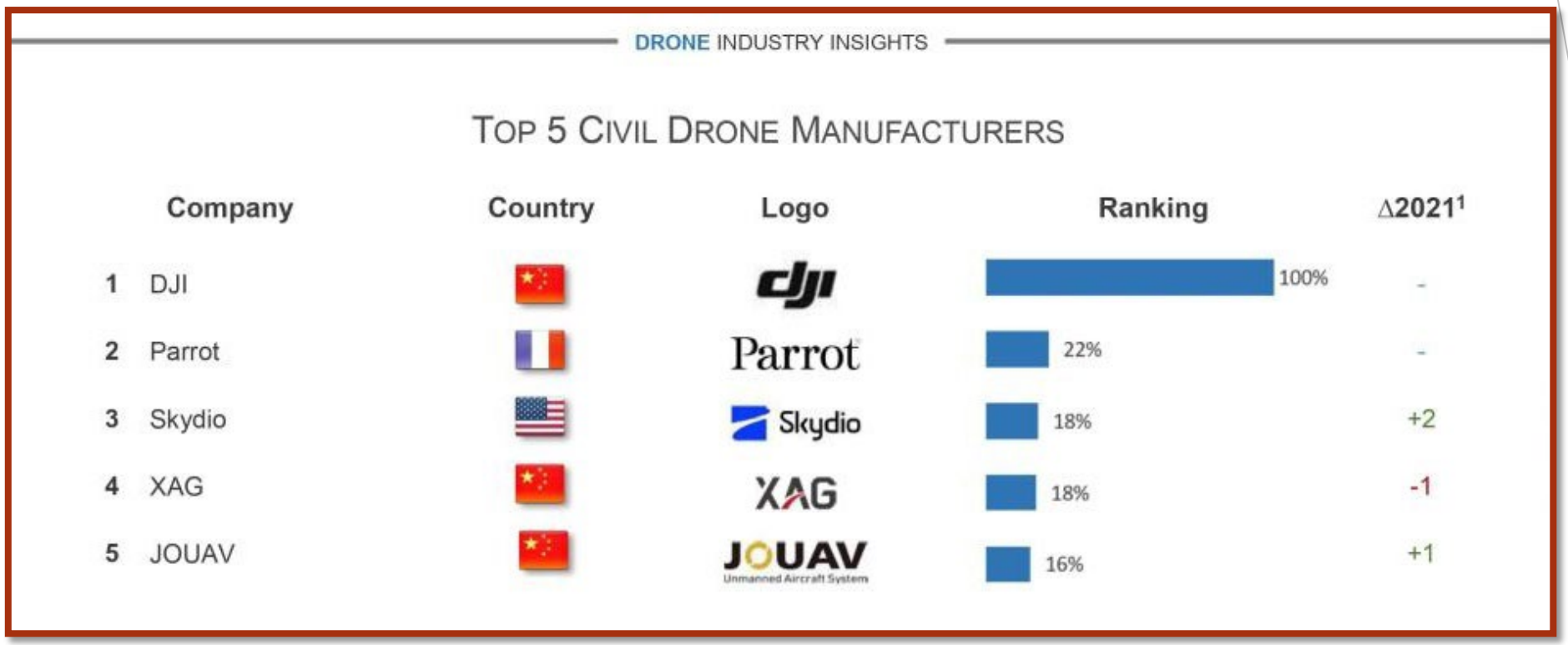
3.78 MB, 4000x2250

Cattle Inspection Video

The drone market



- DJI Ban
  - Federal agencies (Department of State, Interior, and Defense)
  - Four states: Arkansas, Florida, Mississippi, Tennessee (Local government agencies)

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Drones used for imaging

DJI Mini 3
- ✓ Flight time: 51 min max
- ✓ 48 MP Camera
- ✓ **NO** Multispectral camera
- ✓ **$500**

DJI Mini 4 Pro
- ✓ Flight time: 45 min max
- ✓ 48 MP Camera
- ✓ **NO** Multispectral camera
- ✓ **$759**

DJI Mavic 3M
- ✓ Flight time: 37 min/43 min
- ✓ 20 MP RGB Camera
- ✓ Multispectral camera
- ✓ **$4700**

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Drones used for spraying

AGRAS T10
- ✓ Payload: 8 L spraying
- ✓ Hovering time: 17 min/9 min
- ✓ **$11,000**

AGRAS T30
- ✓ Payload: 30 L spraying
  40 L spreading
- ✓ Hovering time: 20 min/7 min
- ✓ **$16,000**

AGRAS T40
- ✓ Payload: 40 L spraying
  70 L spreading
- ✓ Hovering time: 18 min/7 min
- ✓ **$20,000**

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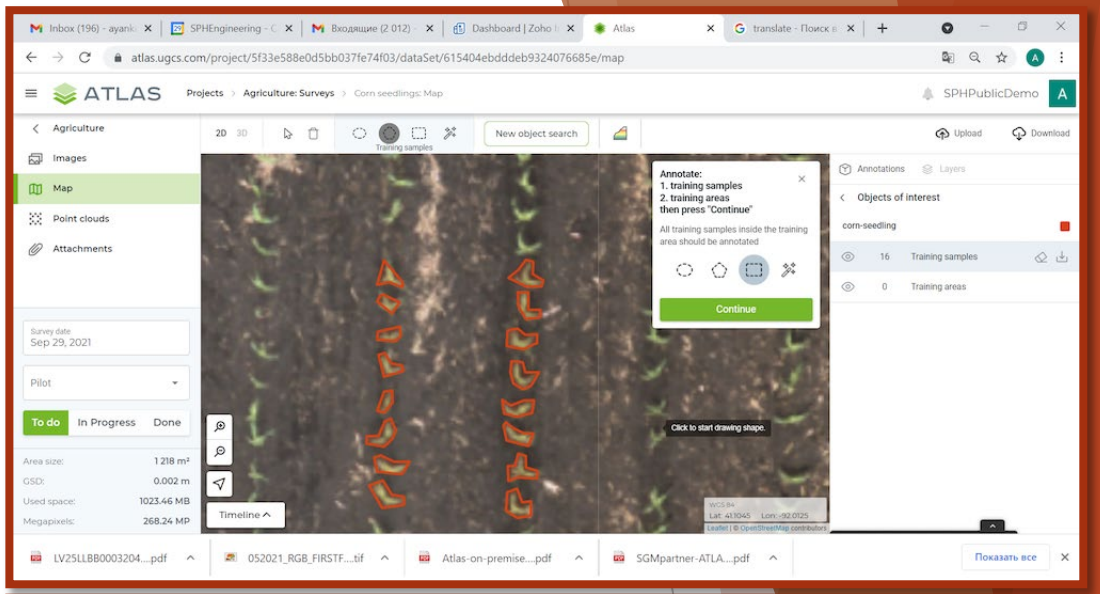
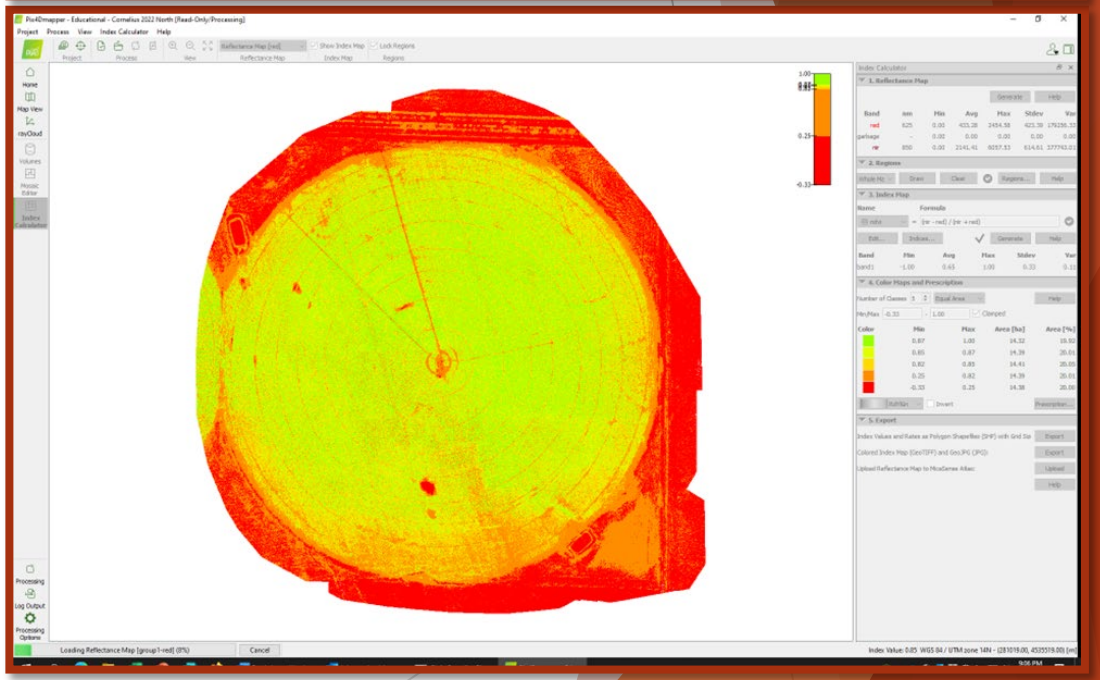
Software & Apps

- ATLAS
- Pix4DMapper
- Taranis
- B4UFly (App & Web)
  https://b4ufly.aloft.ai/?lat=41.1395267620781&long=-100.77149632226255
- UAV Forecast (App & Web)
  https://www.uavforecast.com/
- AgAviation.org www.AgAviation.org





EXTENSION

Drone Benefits and Drawbacks

- Precision applications
- High resolution imaging
- Multispectral imaging
- On demand data
- Can save time and money
- Increase productivity
- Reduce number of workers
- Increase efficacy of management practices

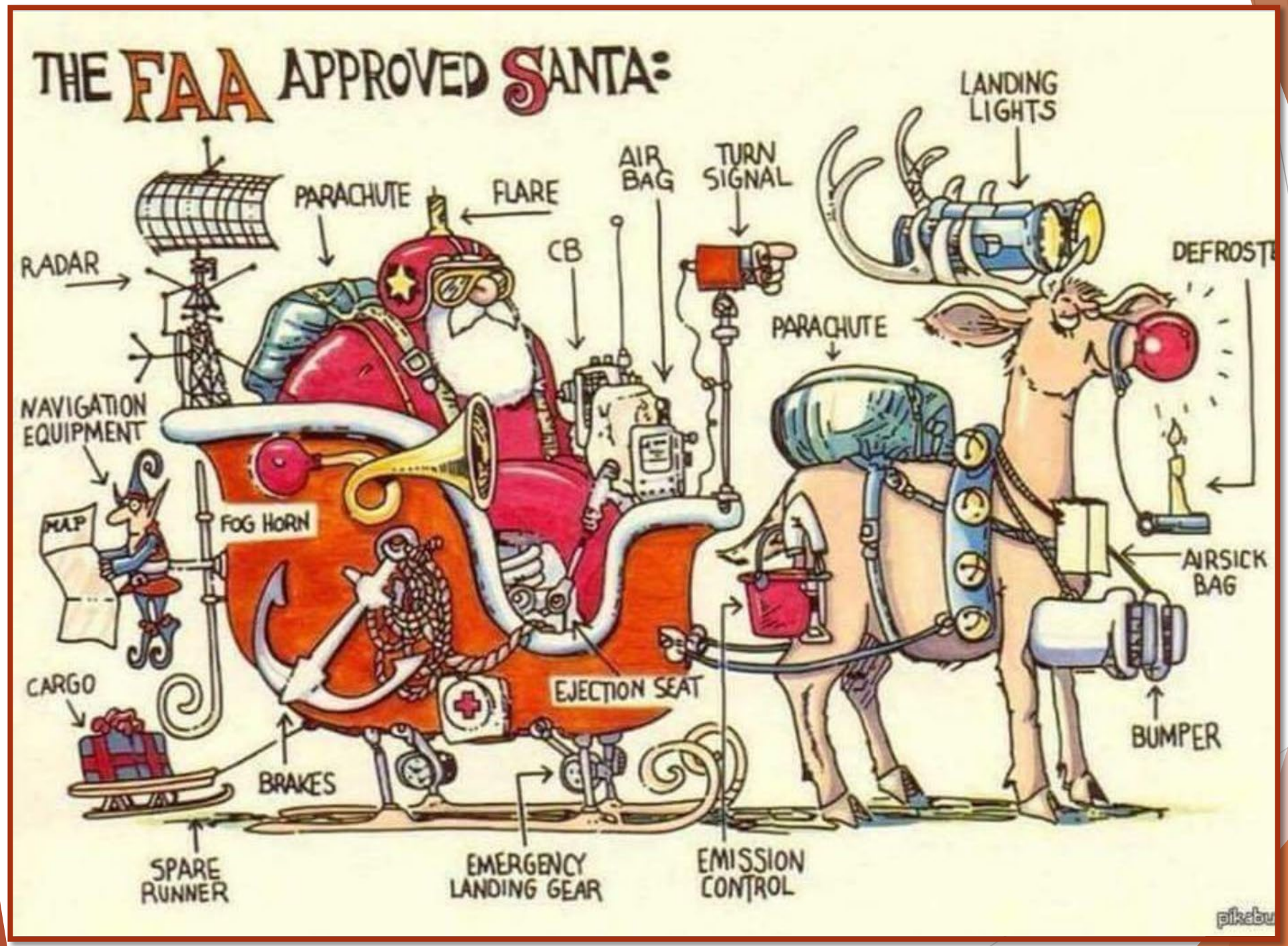
- Limited payloads
- Battery life
- Time consuming software learning process
- Initial costs can be extensive
- Changing federal regulations and licensing requirements
- Weather & airspace conflicts

N EXTENSION

Summary

- The use of drones in agriculture is a fast-growing industry
- Drones can be a useful tool for producers that increase efficiency and reduce costs
- Startup costs (time and money) can be extensive
- Federal regulations and licensing requirements are in place to ensure safety, but add cost
- Drone technology can’t completely replace traditional equipment at this time

N EXTENSION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LANDING LIGHTS
AIR BAG
TURN SIGNAL
PARACHUTE
FLARE
RADAR
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DEFROSTE
PARACHUTE
NAVIGATION EQUIPMENT
MAP
FOG HORN
AIRSICK BAG
CARGO
EJECTION SEAT
BUMPER
BRAKES
SPARE RUNNER
EMERGENCY LANDING GEAR
EMISSION CONTROL
pikabu

THANK YOU!