



The different strategies of fighting LSD in Israel in five outbreaks, between 1989 and 2019. What have we learned?

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Plan of the presentation

- Some facts about Israel
- The special epidemiological situation in Israel
- Outbreaks of LSD in Israel and their management



Israel



- ❖ 9 million People
 - 75% Jews
 - 21% Arabs, Druze, Bedouins
 - 4% other religions
- ❖ 22,000 Square km
- ❖ Long borders



Diverse climates

Long summer
short winter



Farms ~

- ❖ Dairy 875
- ❖ Feedlots 500
- ❖ Beef in pasture 150
- ❖ Sheep and goats 3,000
- ❖ Pigs 20
- ❖ Poultry 2,500
- ❖ Fish 100



Livestock in Israel (heads 2019)



Cattle

450,000



Buffaloes

300



Sheep

435,000



Goats

85,000



Camels

3,000



Pigs

200,000



Poultry

45 millions (at any given moment)



Fish

25,000 tons (production per year)



Bee hives

80,000



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The challenging Epidemiological Situation



Special epidemiological situation

The challenge to cope with high incidence of animal diseases

- ❖ Central location (Europe Asia & Africa)
- ❖ Various microclimates
- ❖ Various ethnic populations and modes of agriculture
- ❖ Outbreaks in neighboring countries
- ❖ Smuggling and illegal import of animals
- ❖ Animal passage through borders
- ❖ Birds Migratory route (twice a year)



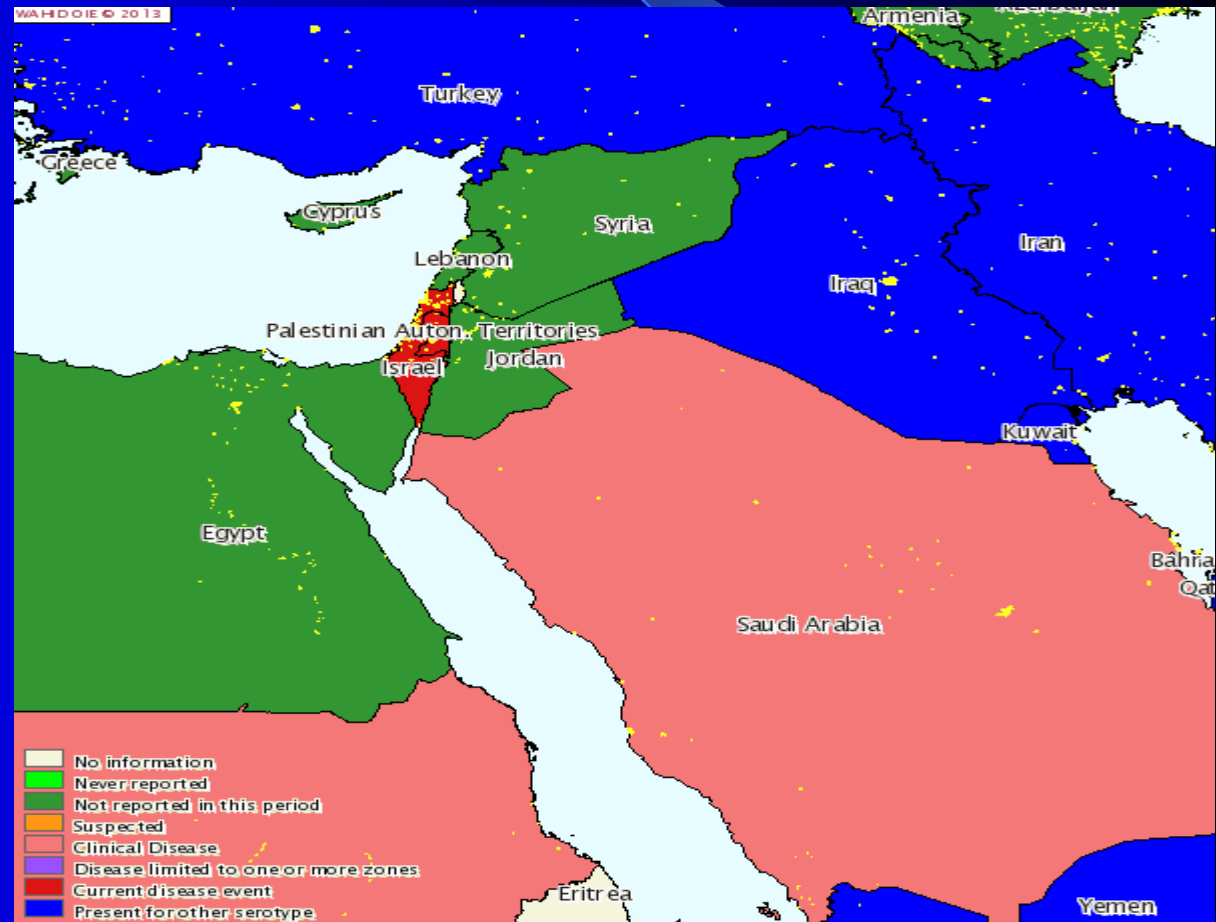
Special epidemiological situation
The challenge to cope with high incidence of
animal diseases

- ❖ High density of farms
- ❖ Close distance among farm animals, wildlife and population.
- ❖ Long summer – optimal conditions for arthropods.
- ❖ Very sophisticated dairy and broiler industry – Every drop in production is recorded.

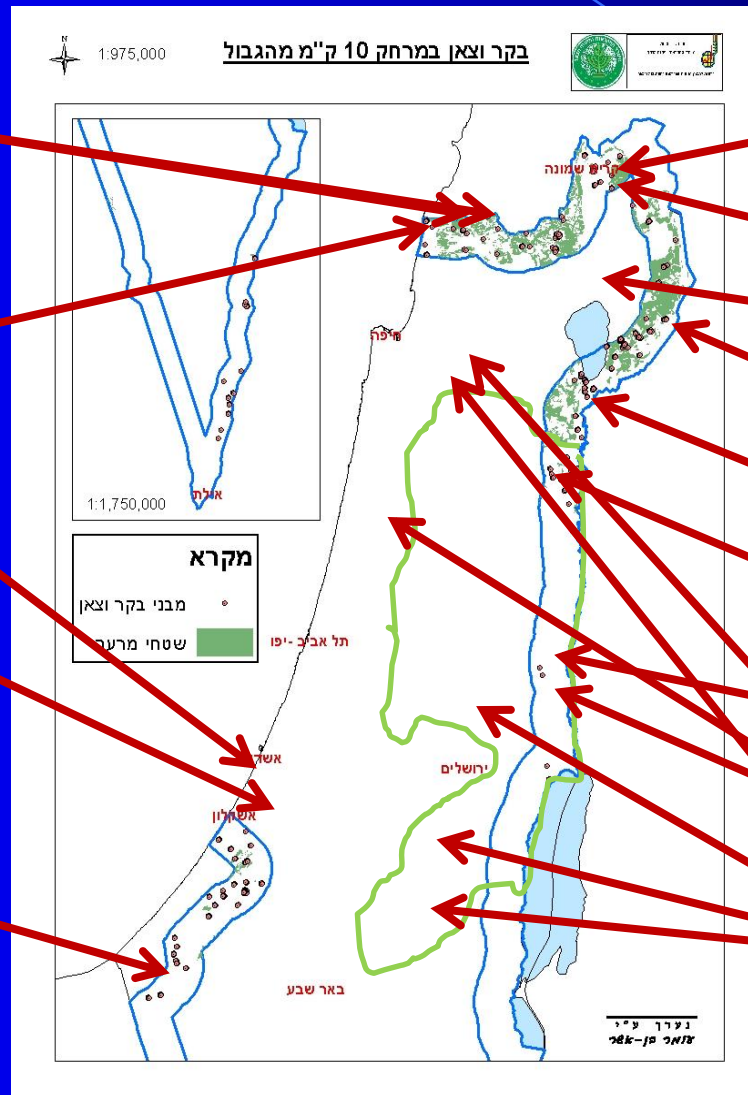


Neighboring countries

- ❖ Not all of them are friendly.
- ❖ Political status doesn't allow good epidemiological data exchange.
- ❖ Limited notification to OIE.
- ❖ Limited VS activities.
- ❖ No surveillance in imported animals.



Infectious Diseases



FMD 2007
FMD 2017

FMD 2011
LSD 2012
FMD 2014

•FMD 2017

BTV-8 2008

BTV-8 2008

BEF 2014

FMD 2007
LSD 2019

LSD 2006

FMD 2011

EHDV 2006

SAT2 2012
LSD 2007
FMD 2017

BEF 2000

FMD 2014

FMD 2017



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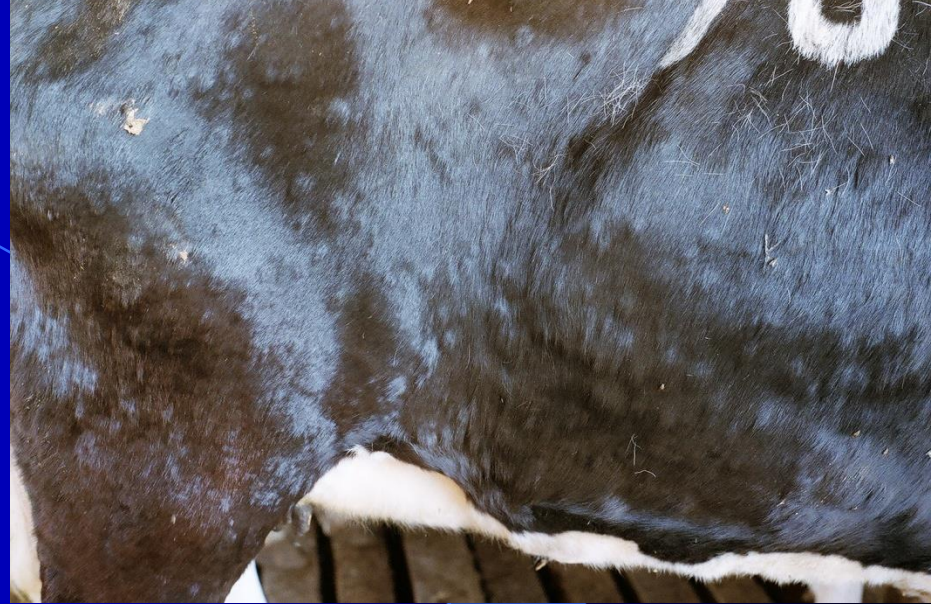




Clinical manifestations

- **Lumps: round confined areas of erected hair, measuring 0.5 to 7cm in diameter.**
- **They are firm and slightly raised above the surrounding normal skin.**
- **The lesions are of full skin thickness involving the epidermis, dermis and adjacent subcutis.**
- **The nodules are present particularly on the head, neck, udder and perineum.**
- **Development of lesions may be found anywhere in the oropharynx and the upper respiratory tract, causing pneumonia.**
- **Severely infected animals become emaciated and may require euthanasia.**













Control

- **Vector control in premises and on animals.**
- **Extensive vaccination campaigns**
- **Vaccination in response to the outbreak**
- **Movement controls**
 - **do not contain outbreaks of LSD.**
 - **prevent new foci at a certain distance.**
- **Stamping out or modified stamping out.**









History of LSD in Israel



1988 LSD outbreak in Egypt





History of LSD in Israel

1988 LSD outbreak in Egypt



1989 – First LSD outbreak in Israel one foci (Pduyym)
all herds in Moshav were culled (800 dairy cows)





Pduyym 1989





History of LSD in Israel

1988 LSD outbreak in Egypt



1989 – First LSD outbreak in Israel one foci (Pduyym)
all herd was culled (dairy cattle)



2006 - one area was affected, only sick cattle (1/3) were
culled (205 dairy cows)





Ein Zurim - 2006

- ❖ June-August 2006
- ❖ 205 dairy cows died or were culled.
- ❖ Few cows were affected in two adjacent moshavs.







History of LSD in Israel

1988 LSD outbreak in Egypt



**1989 – First LSD outbreak in Israel one foci (Pduyym)
all herd was culled (dairy cattle)**



**2006 - one area was affected, only sick cattle were
culled (203 dairy cows)**



**2007 - one area was affected, only sick cattle were
culled (dairy cattle and beef cattle)**





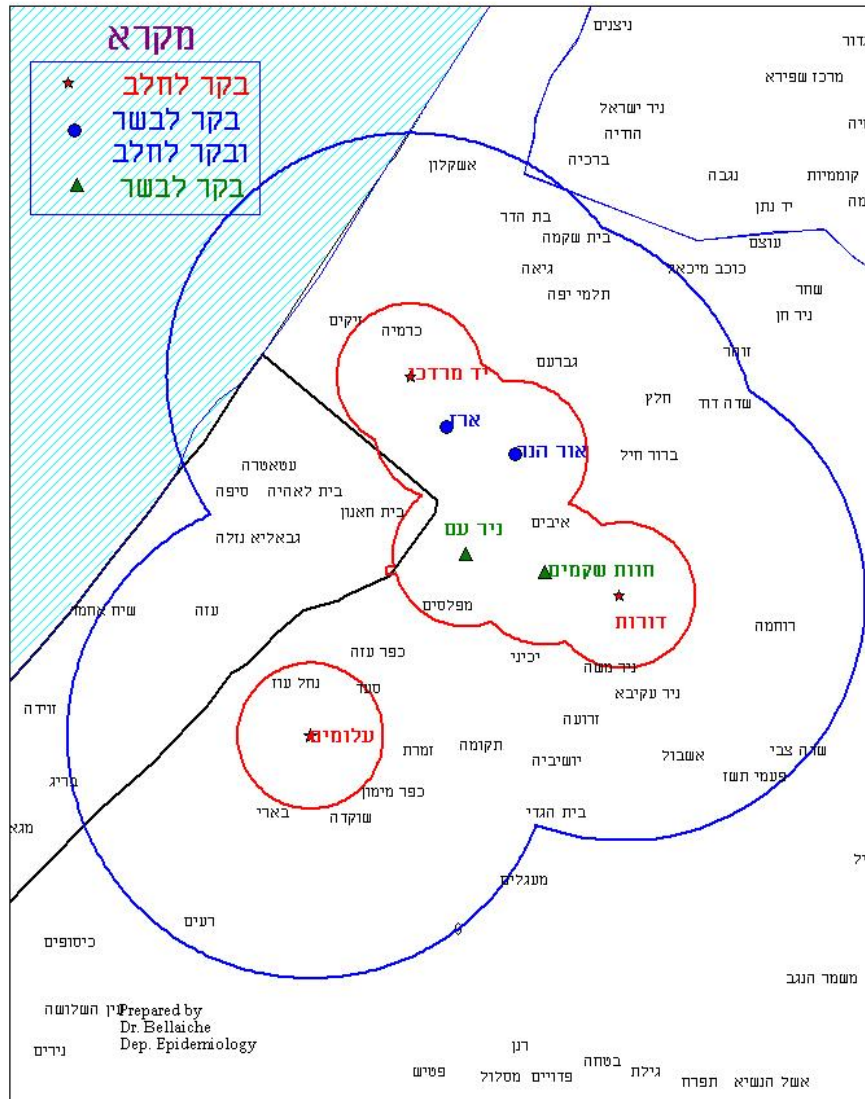
Alumim 2007

- ❖ In May – Gaza strip VS notified the disease.
- ❖ 11/06/07 – first case in Israel. Dairy herd.
- ❖ Severe milk drop several days before the apparition of the lumps.
- ❖ Total of 9 outbreaks- 6 dairy farms and 3 free ranging herds.



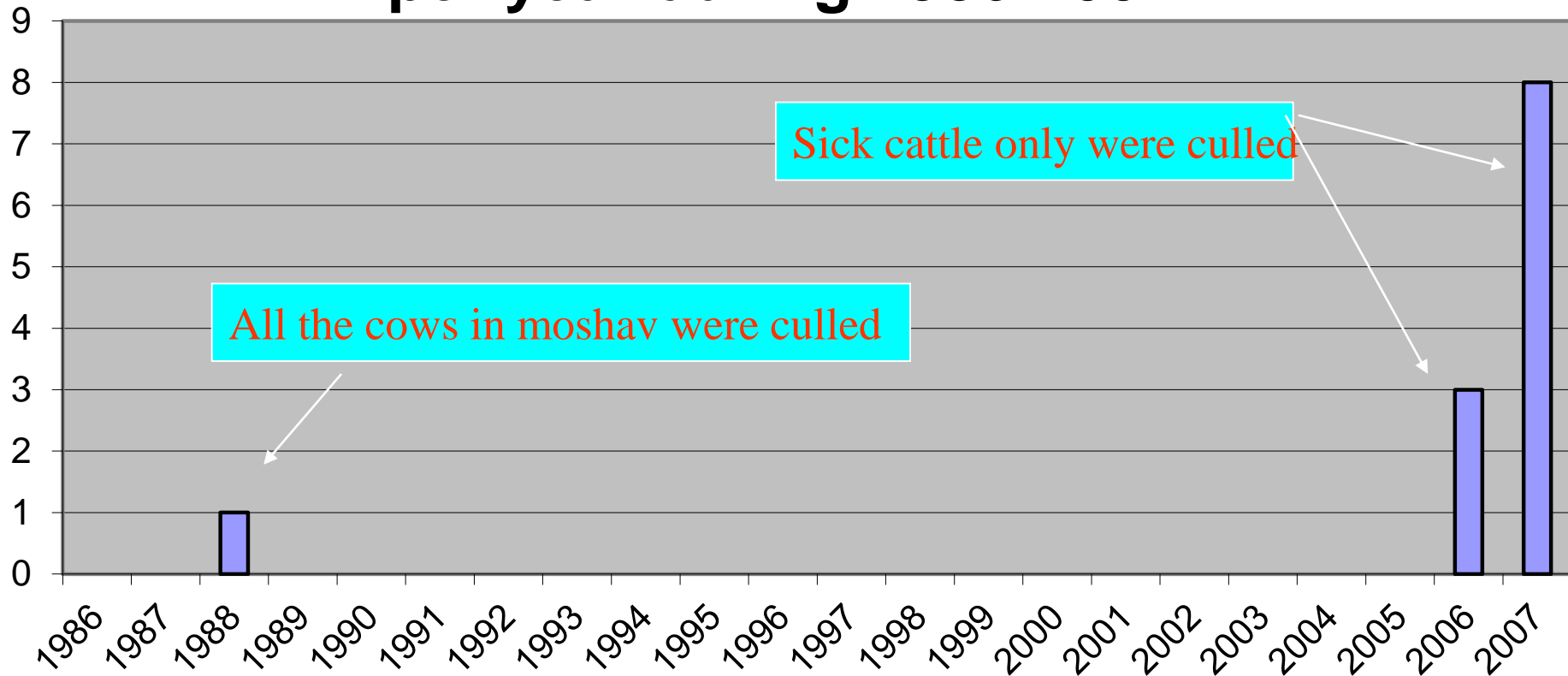


LSD outbreaks 2007



Lumpy skin disease till 2007

Lumpy skin disease - number of affected herds per year during 1986-2007



Till 2007

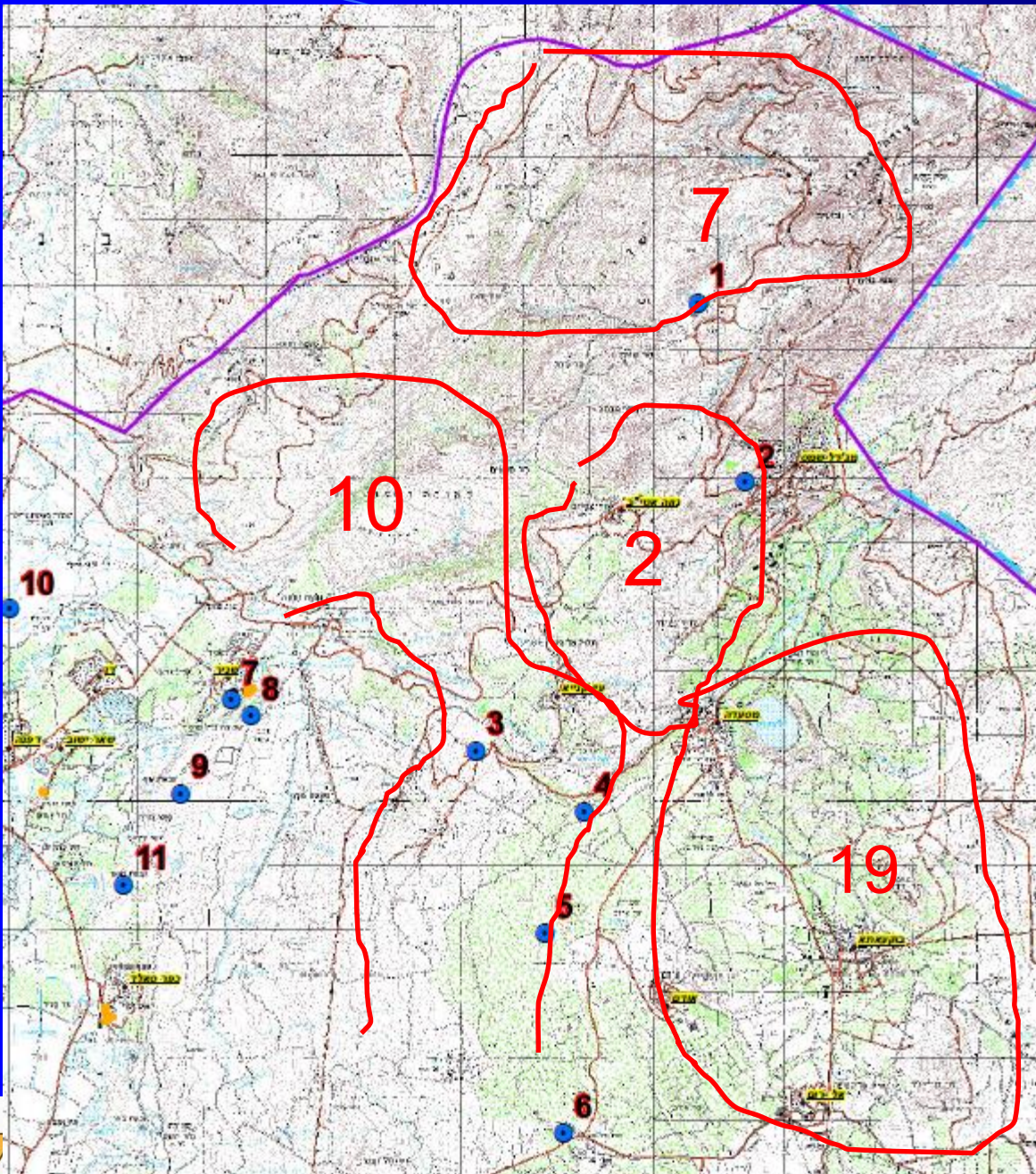


Lumpy skin disease outbreak 2012-2013



LSD spreading - Israel 2012-2013

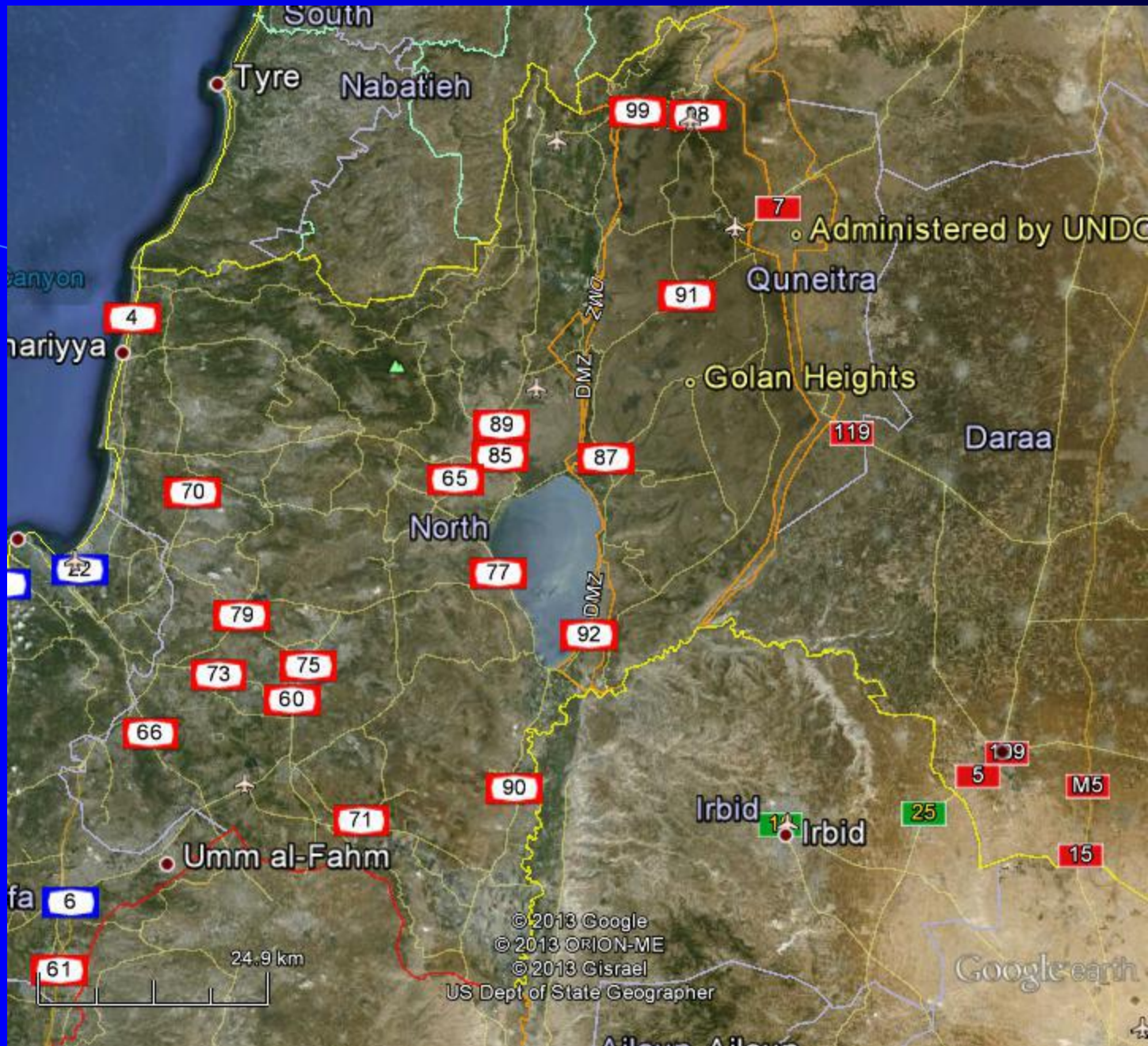




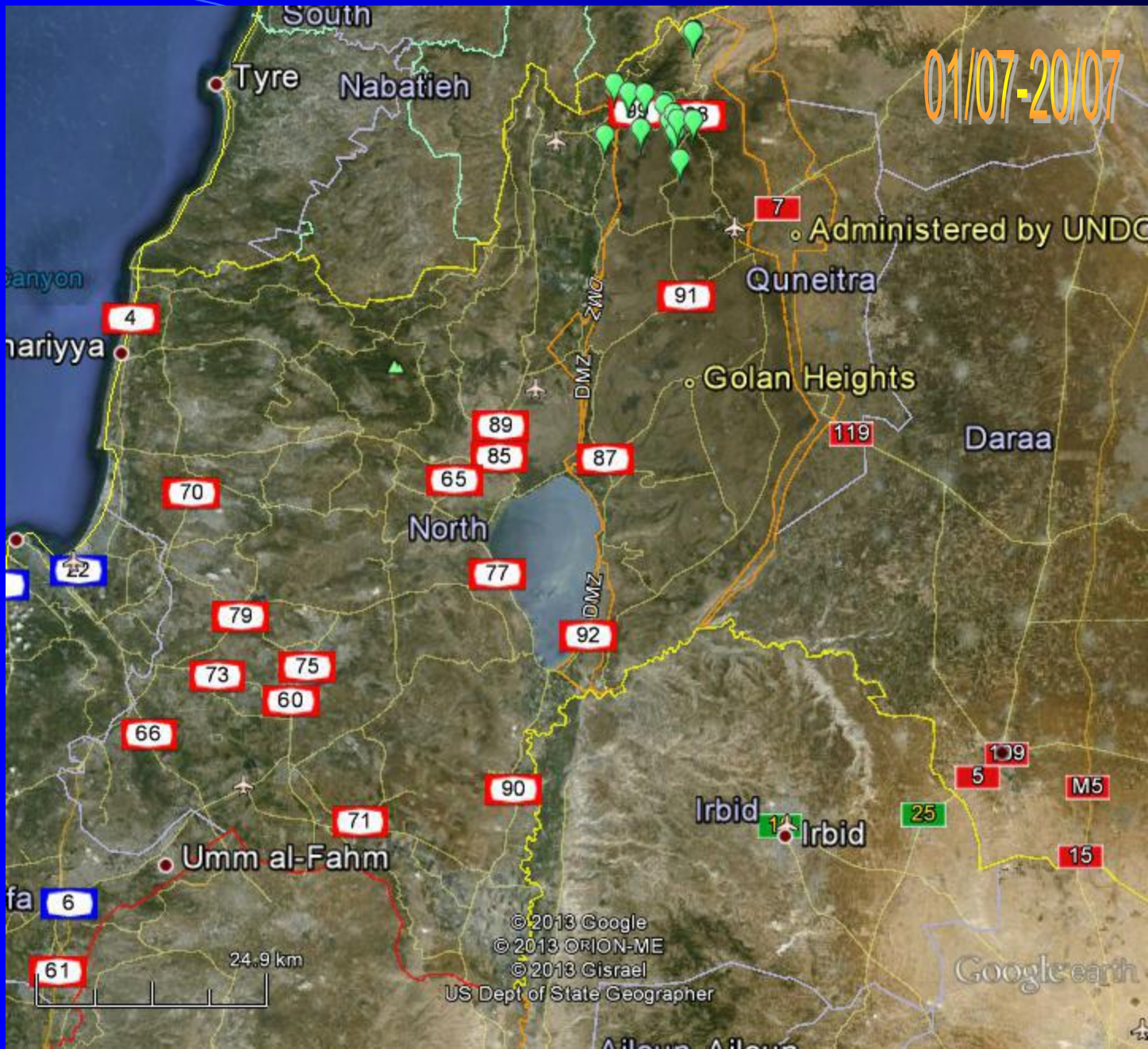
Initial picture 28.07.2012

- ❖ 30-40 Beef herds
- ❖ 4,000 cows
- ❖ Mutual pastures
- ❖ Poor pasture
- ❖ Mountains, forests
- ❖ Over crowding
- ❖ 10-60% morbidity





Beef
Milk



Beef
Milk





Beef
Milk





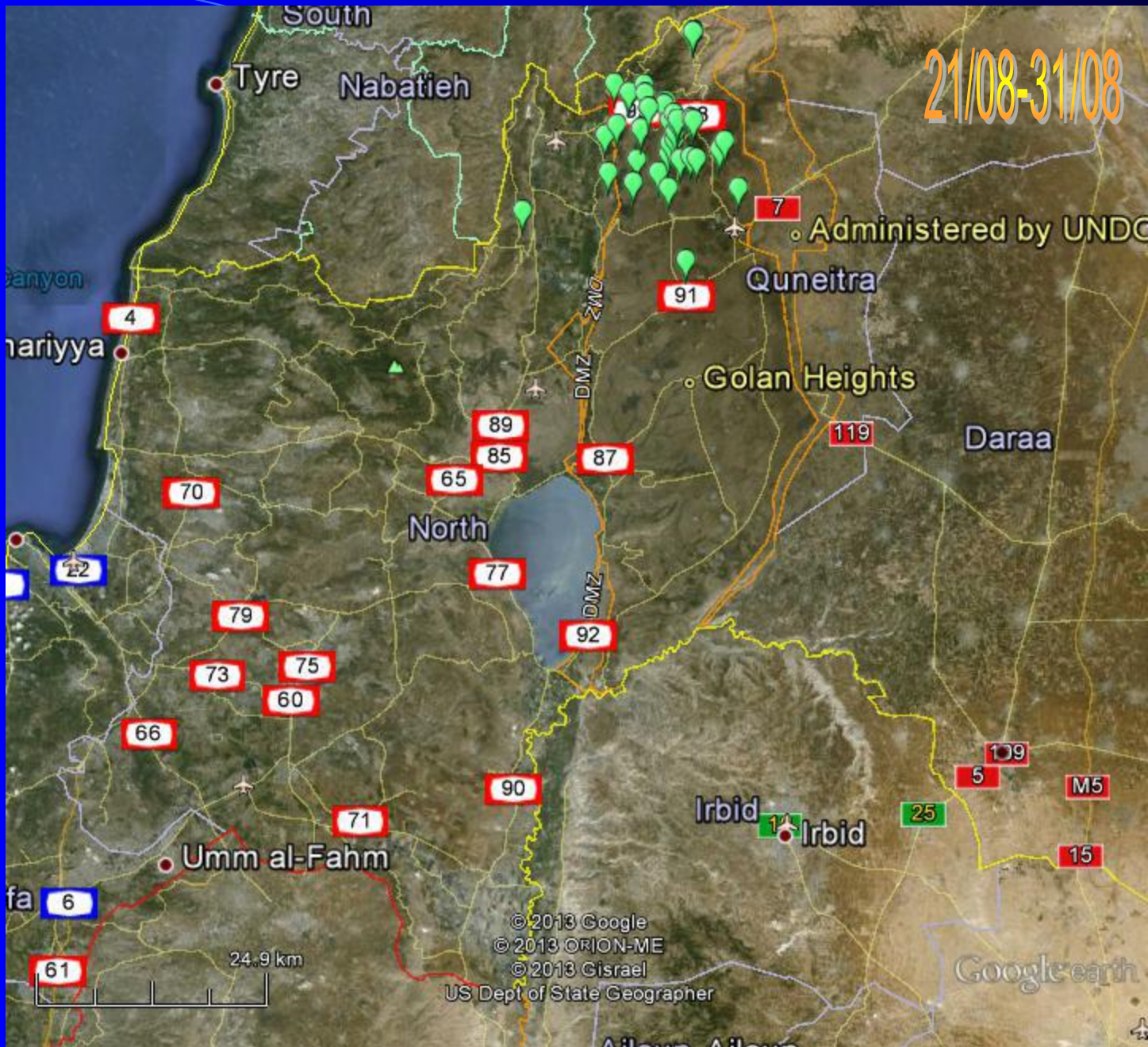
Beef
Milk





Beef
Milk





Beef
Milk





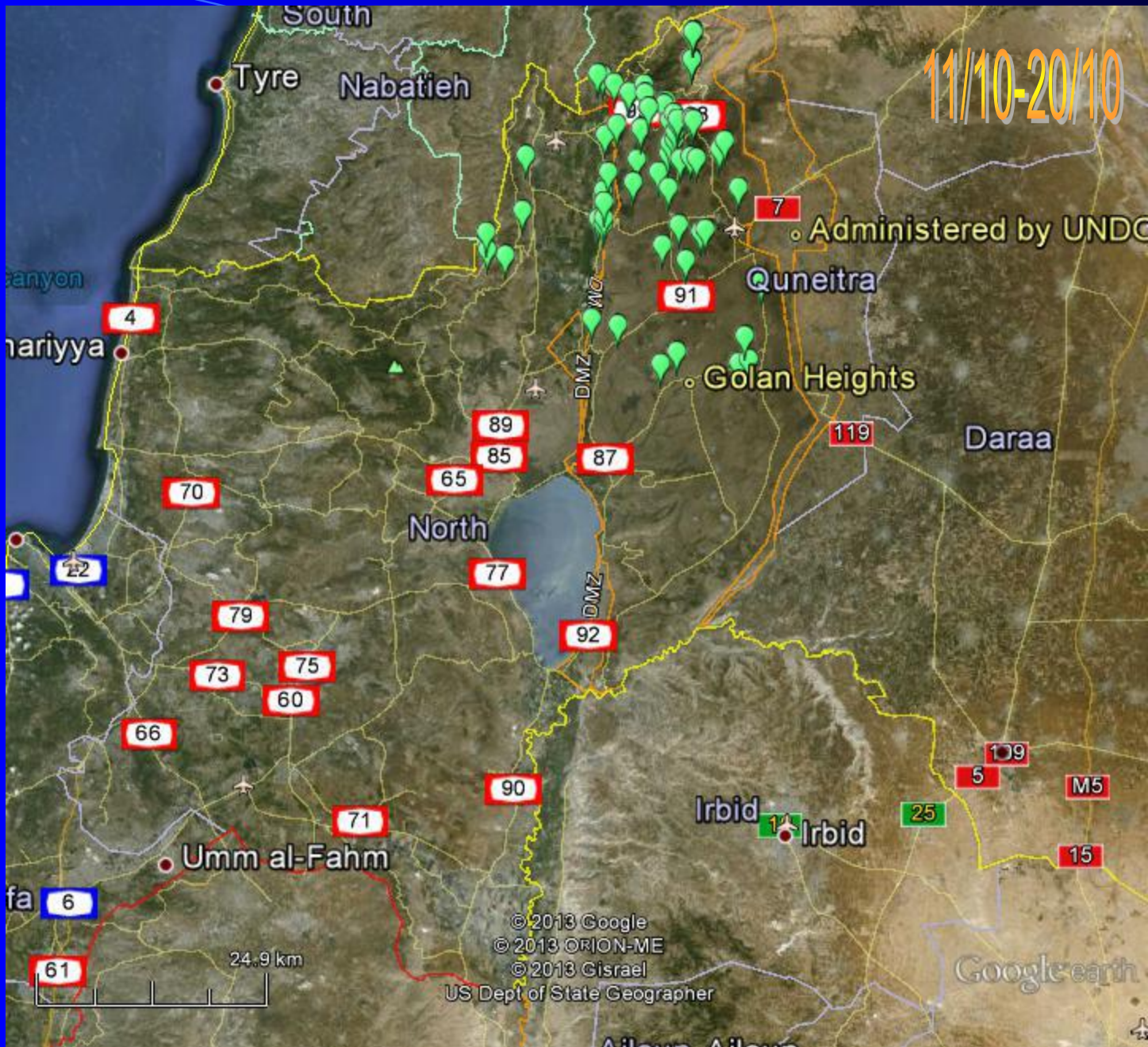
Beef
Milk





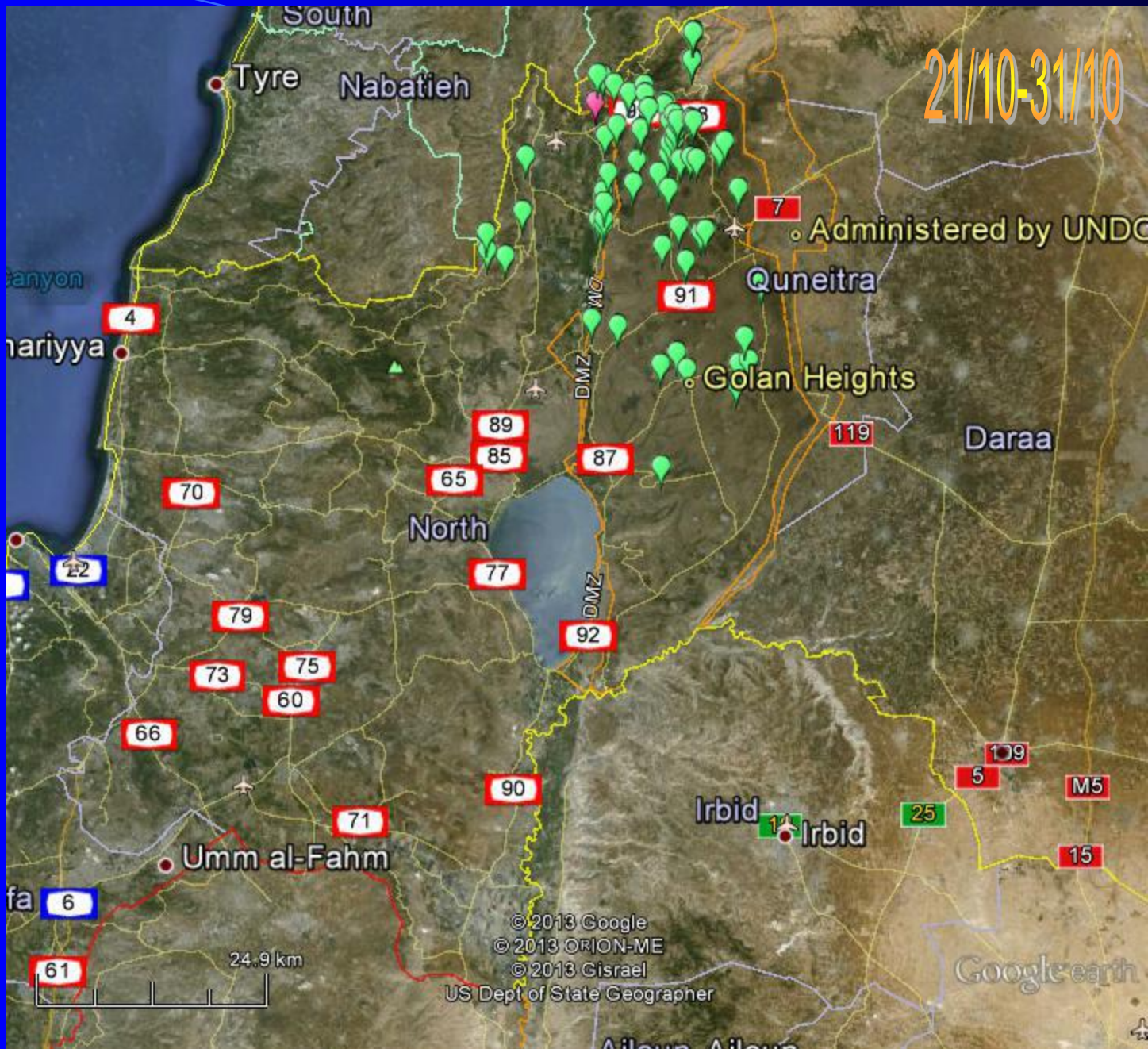
Beef
Milk





Beef
Milk





Beef
Milk



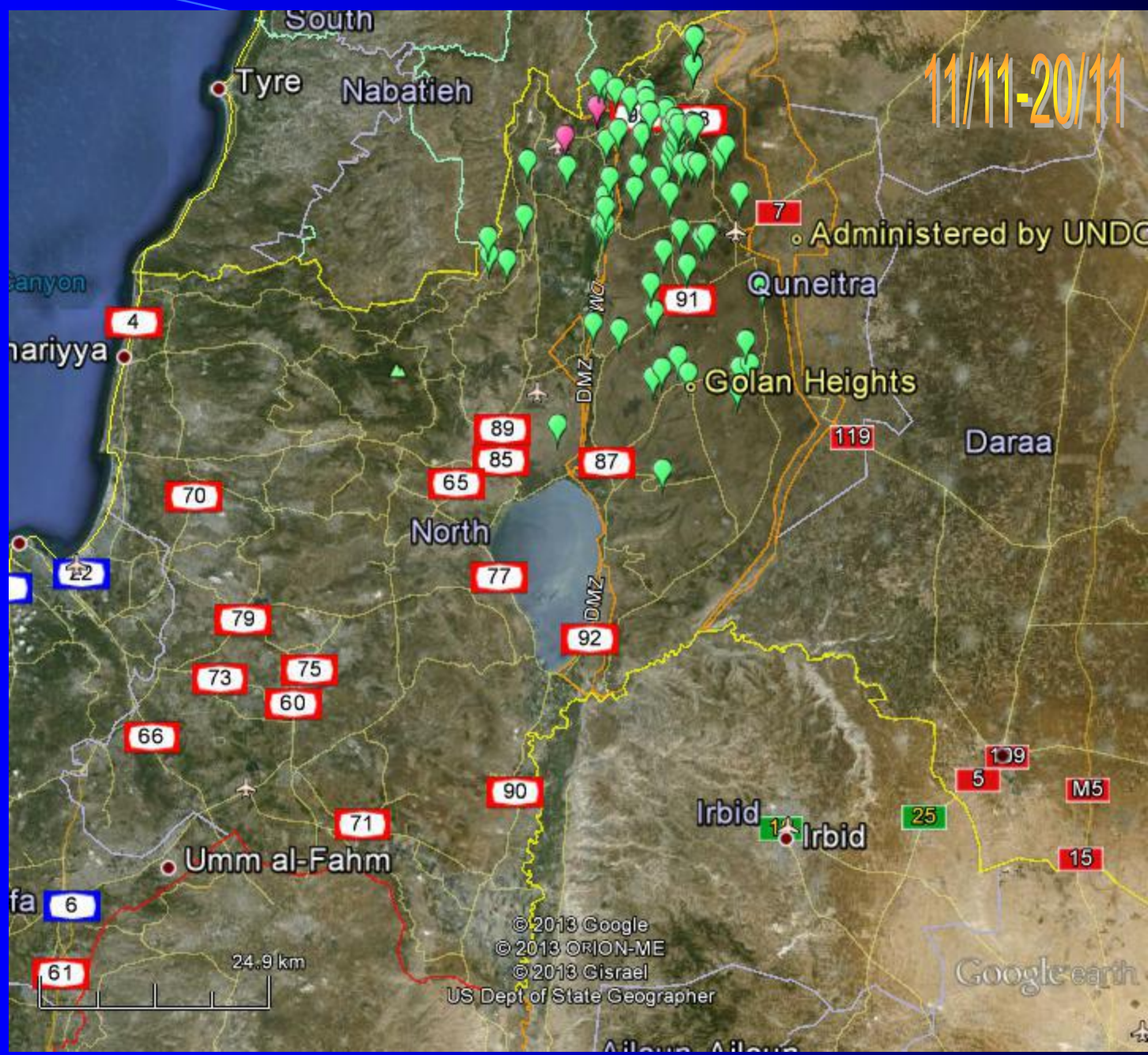


01/11-10/11

Beef
Milk



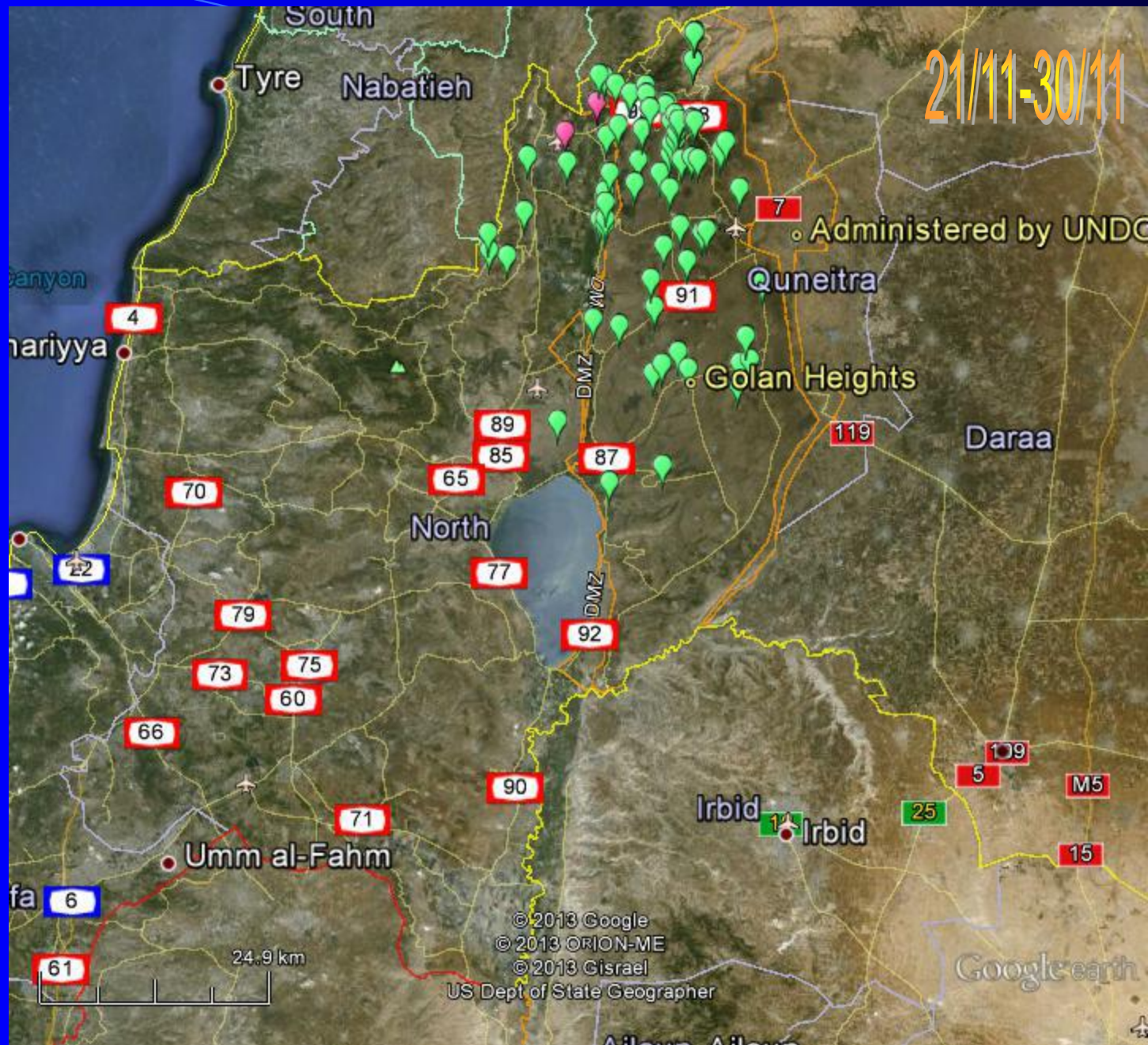
11/11-20/11



Beef
Milk



21/11-30/11



Beef
Milk





Beef
Milk

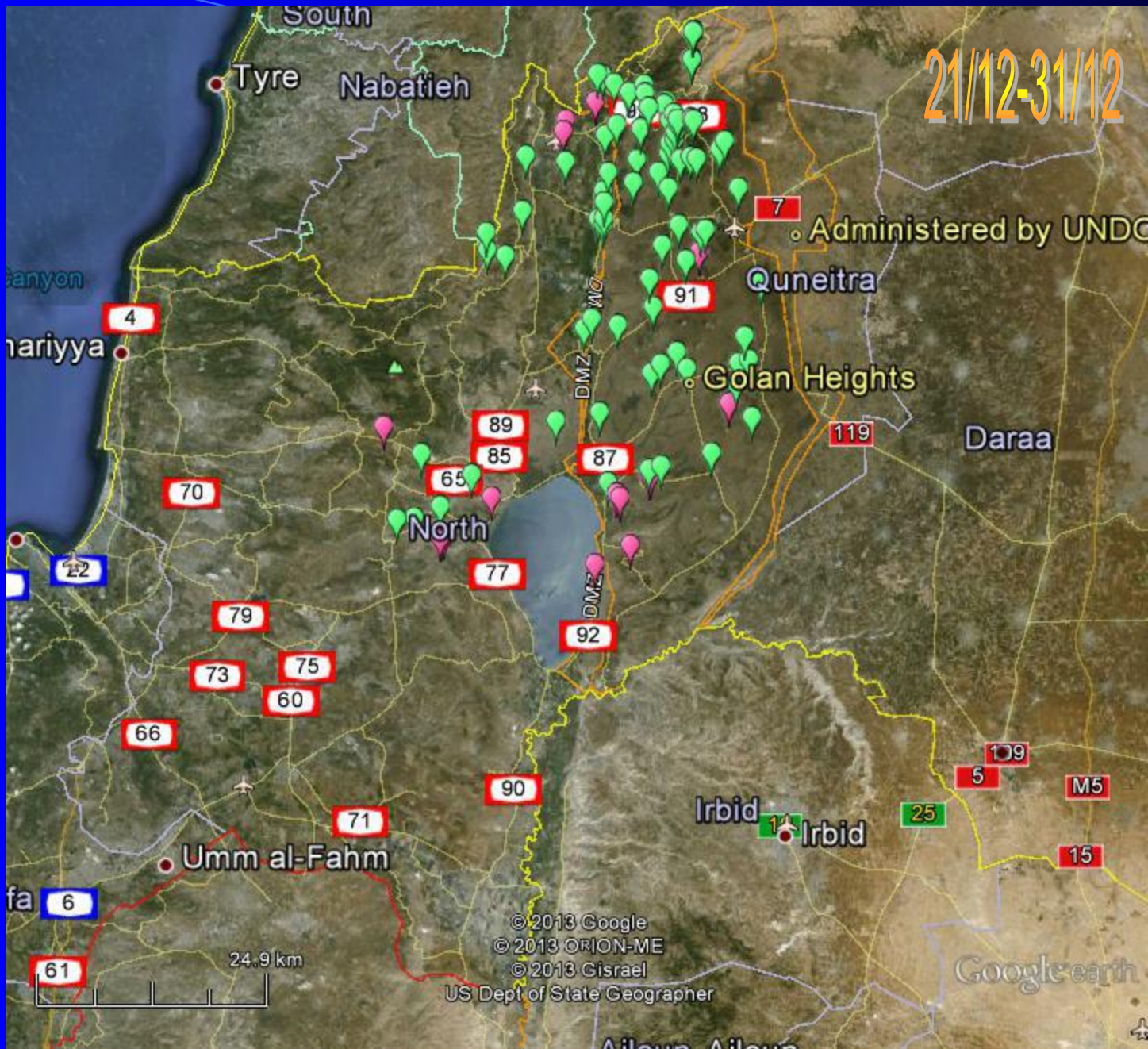


11/12-20/12



Beef
Milk



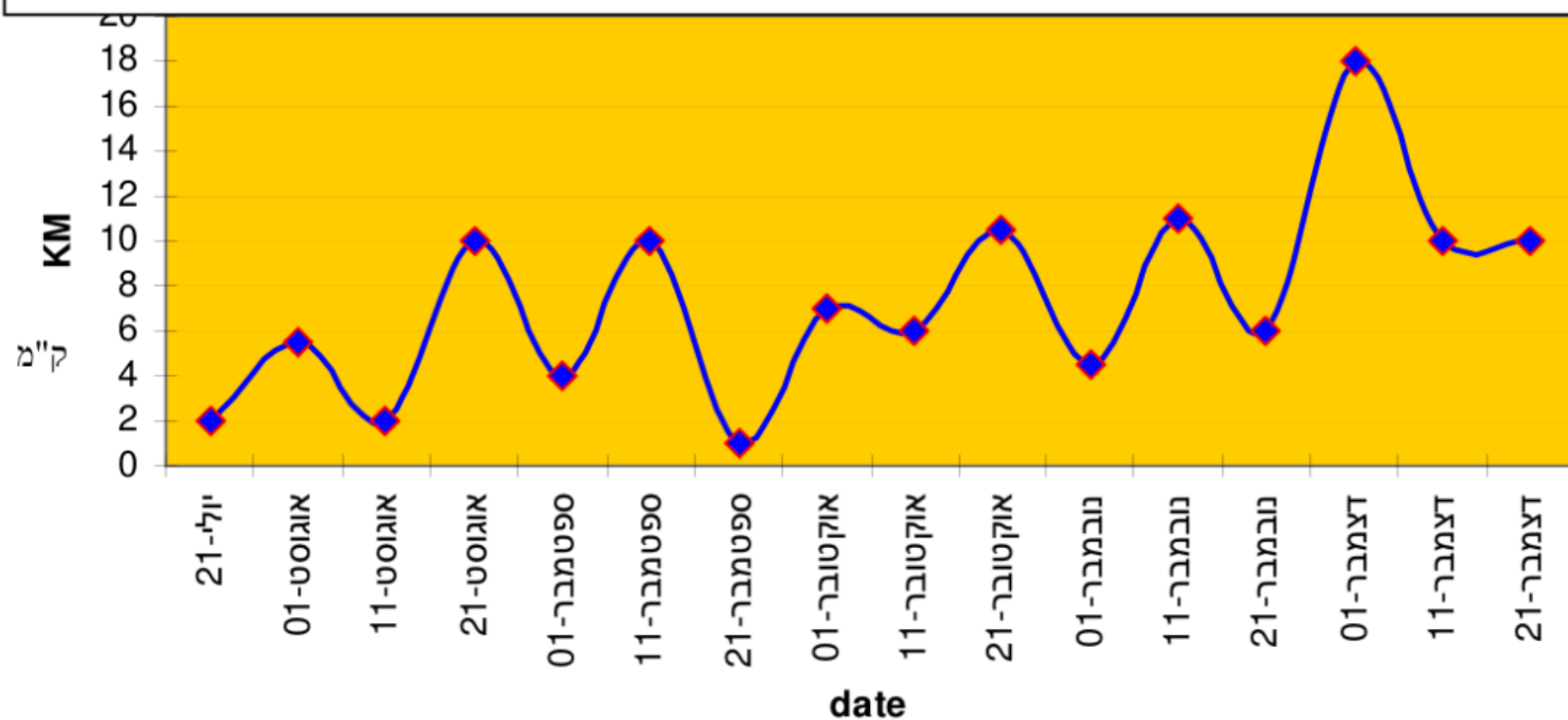


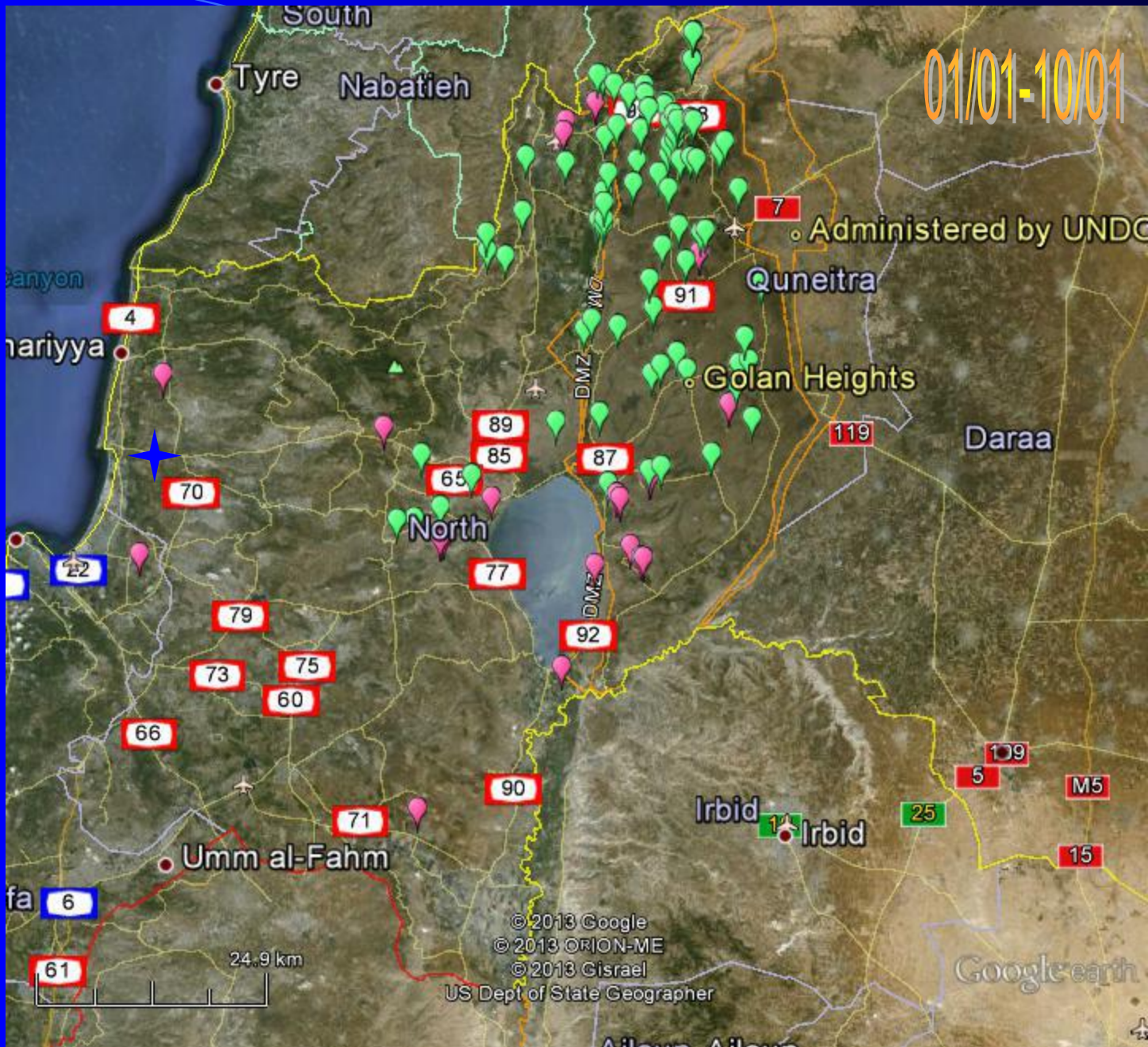
Beef
Milk



Distance from most far affected new herd to its closest previous affected herd

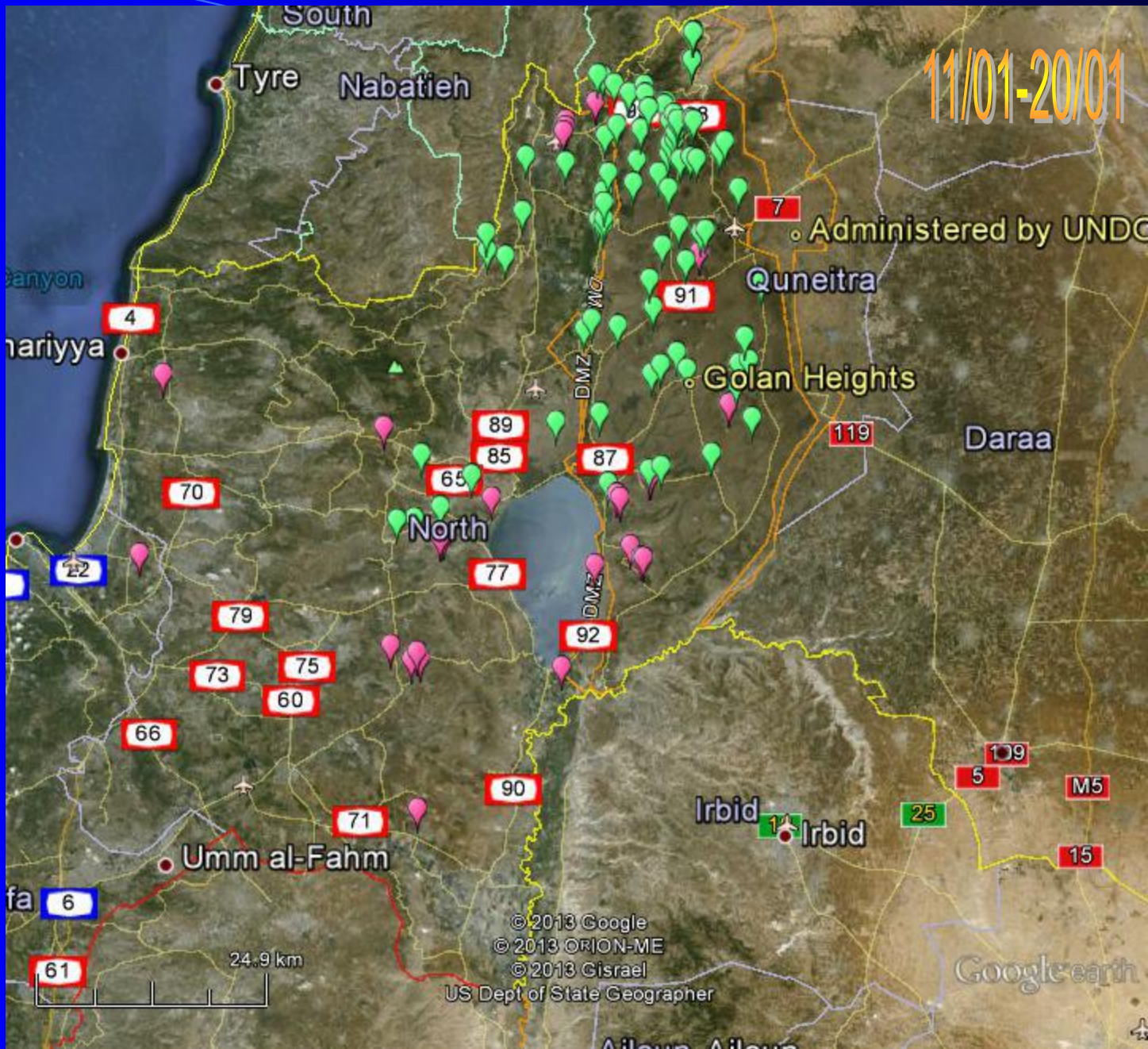
המרחק בין העדר המרוחק ביותר שנפגע במשך תקופה של 10 ימים, לעדר הנגוע הקרוב ביותר





Beef
Milk

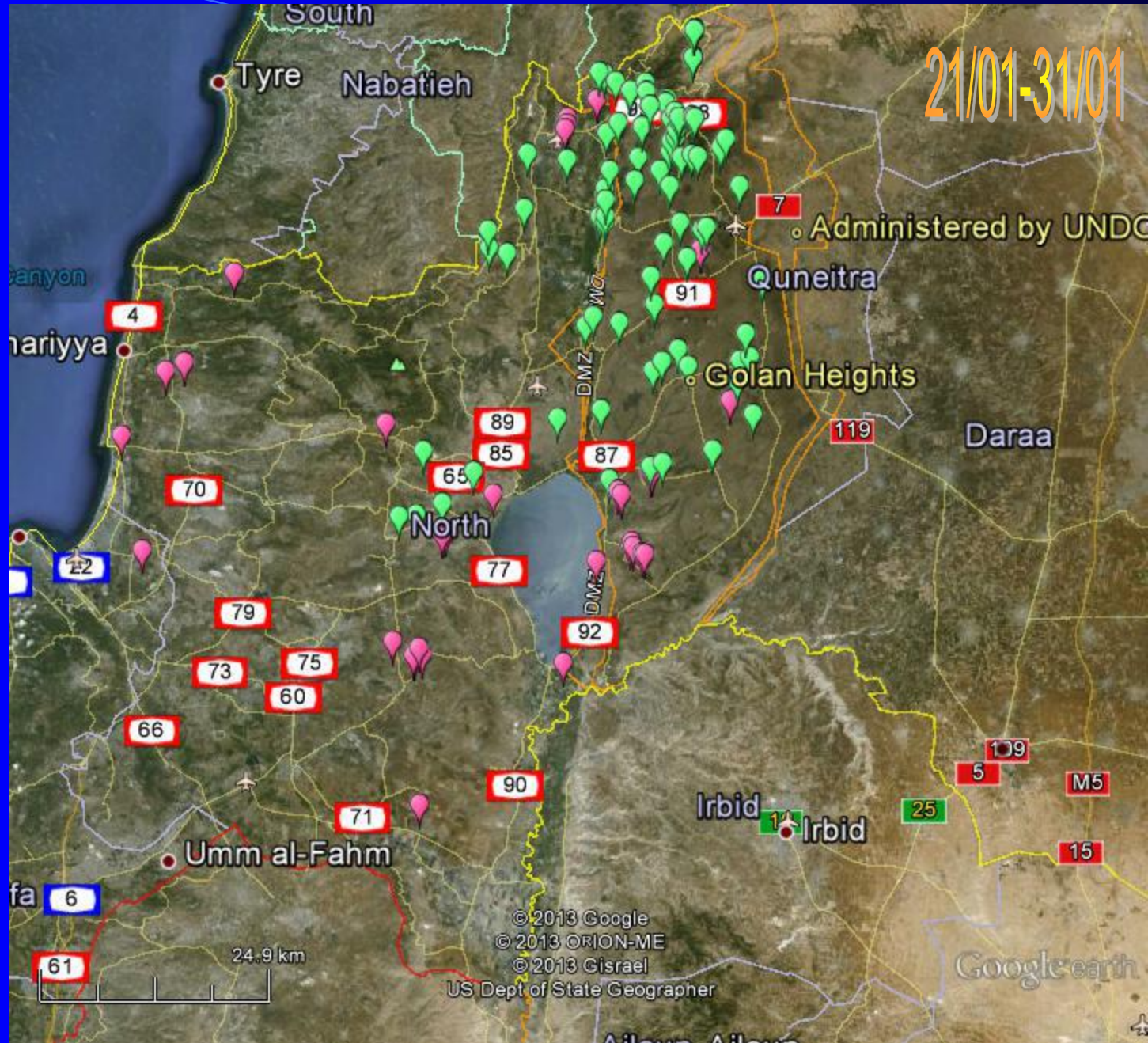




Beef
Milk

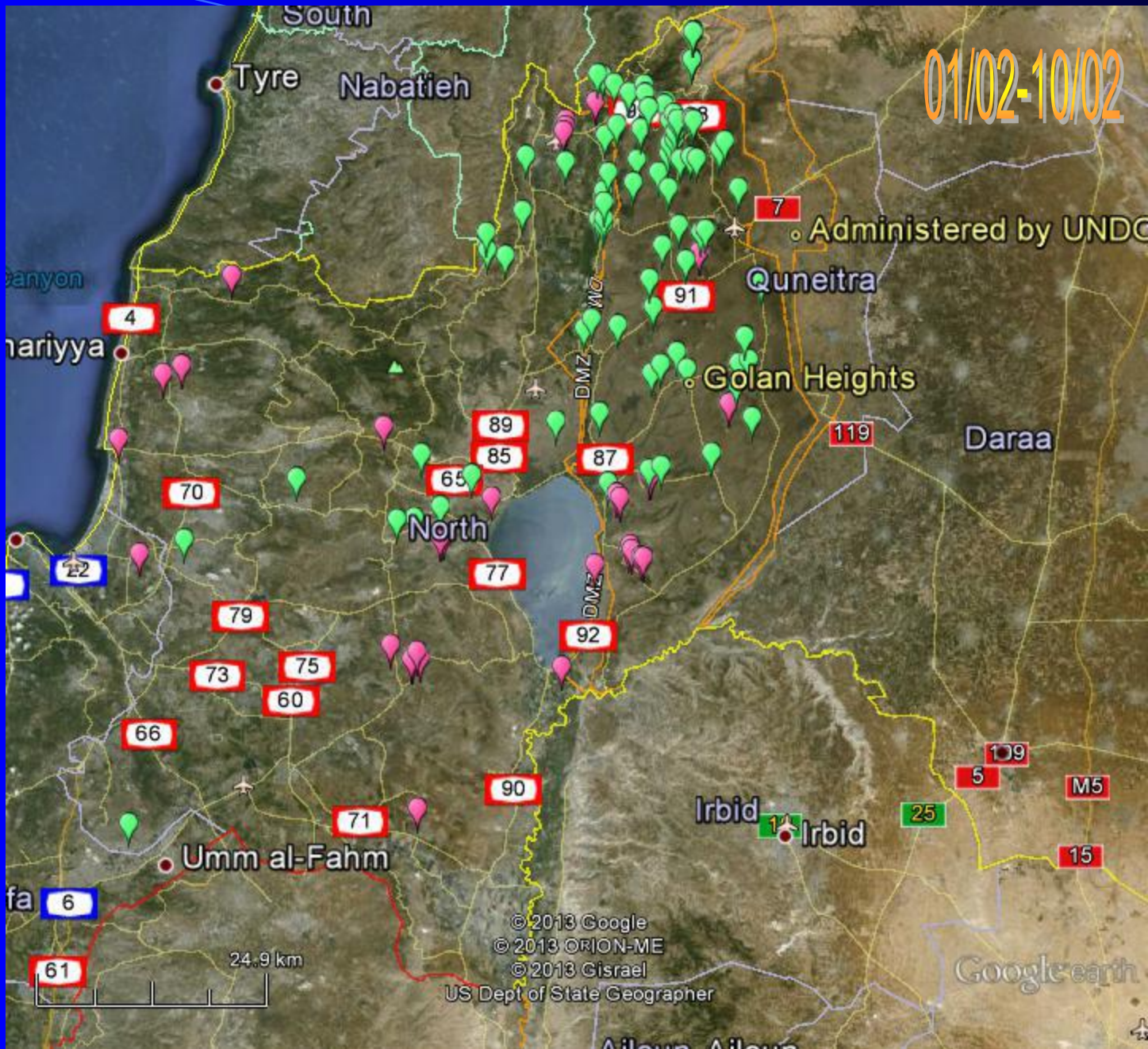


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Beef
Milk

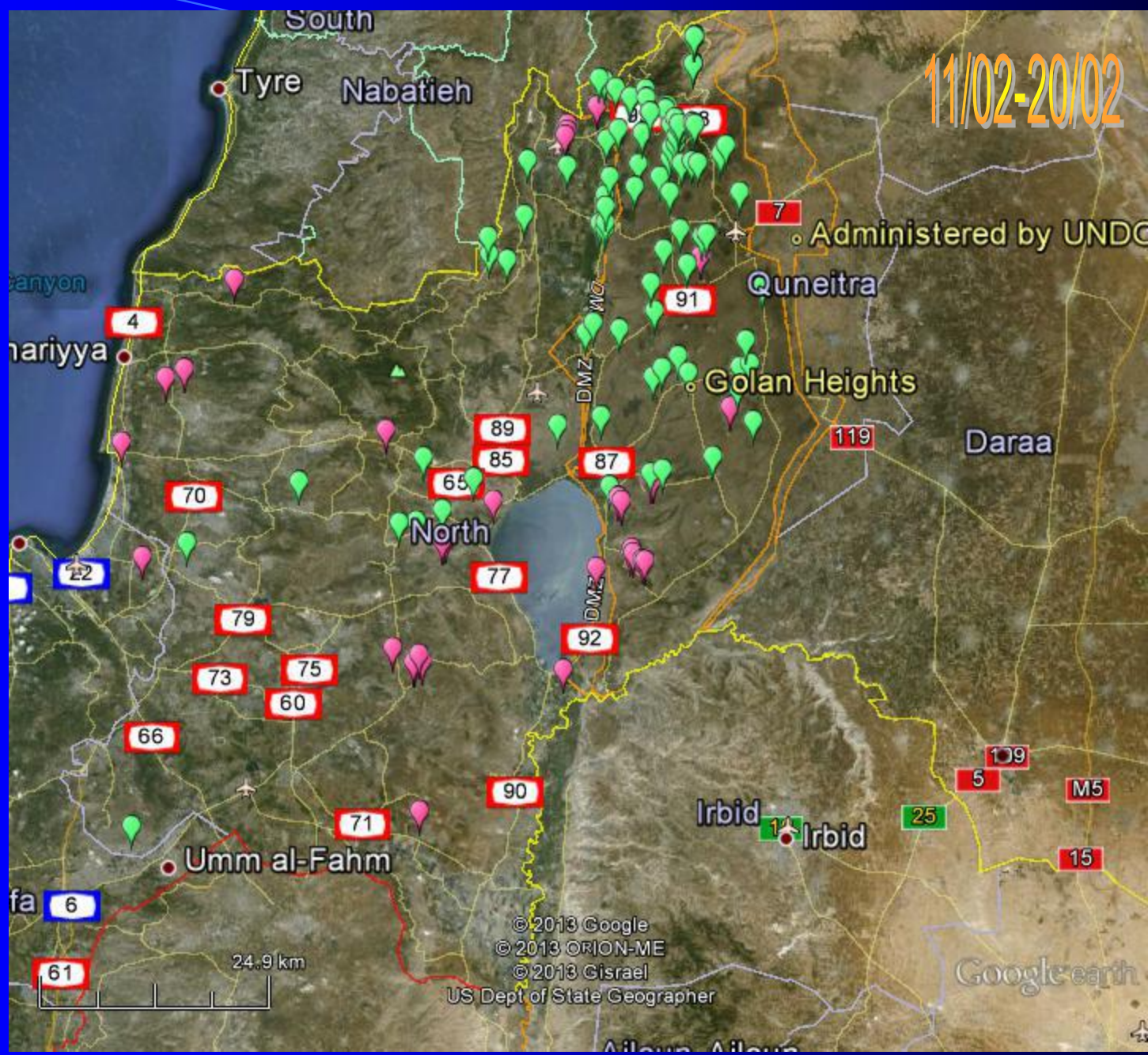




Beef
Milk



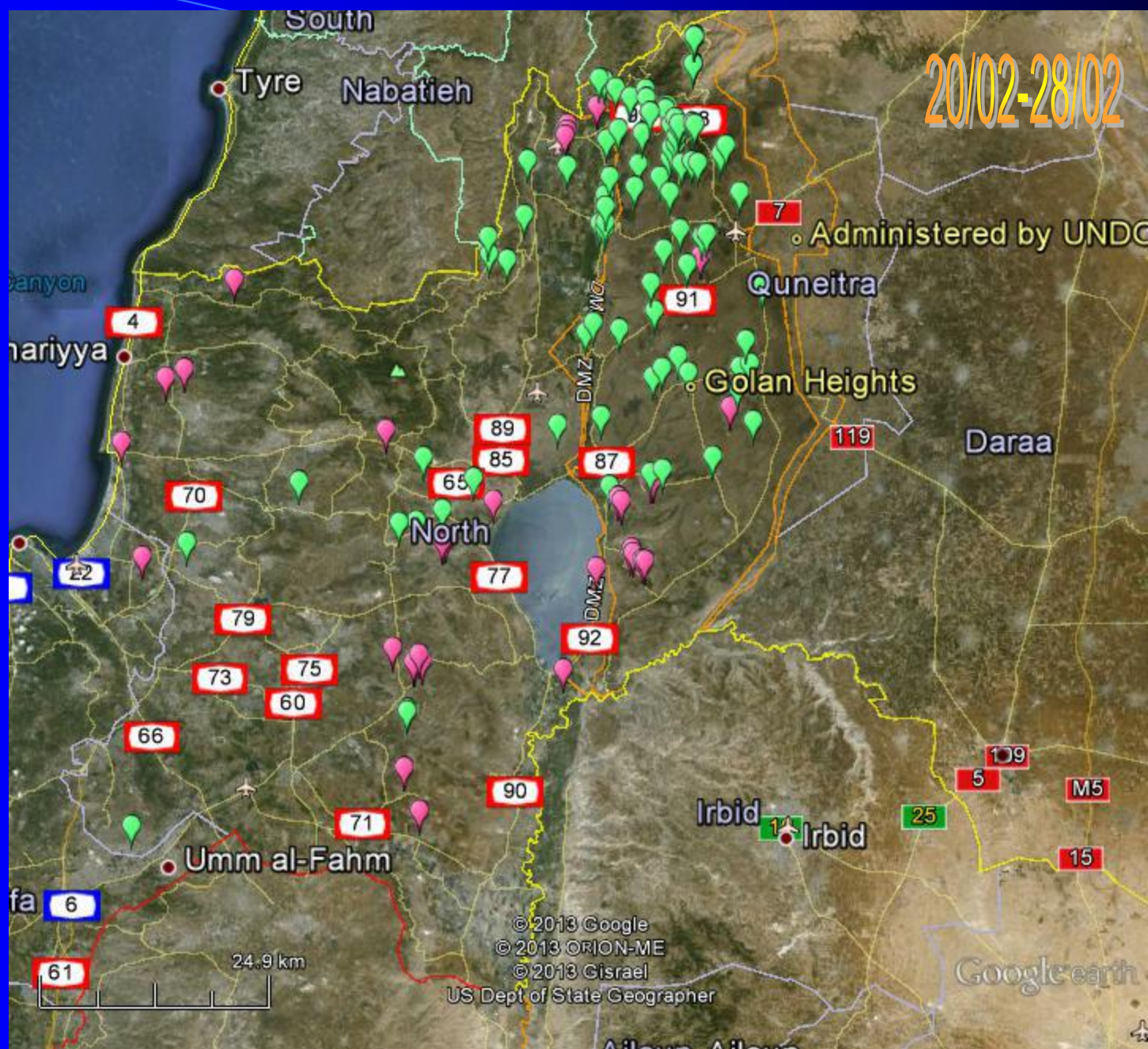
11/02-20/02



Beef
Milk

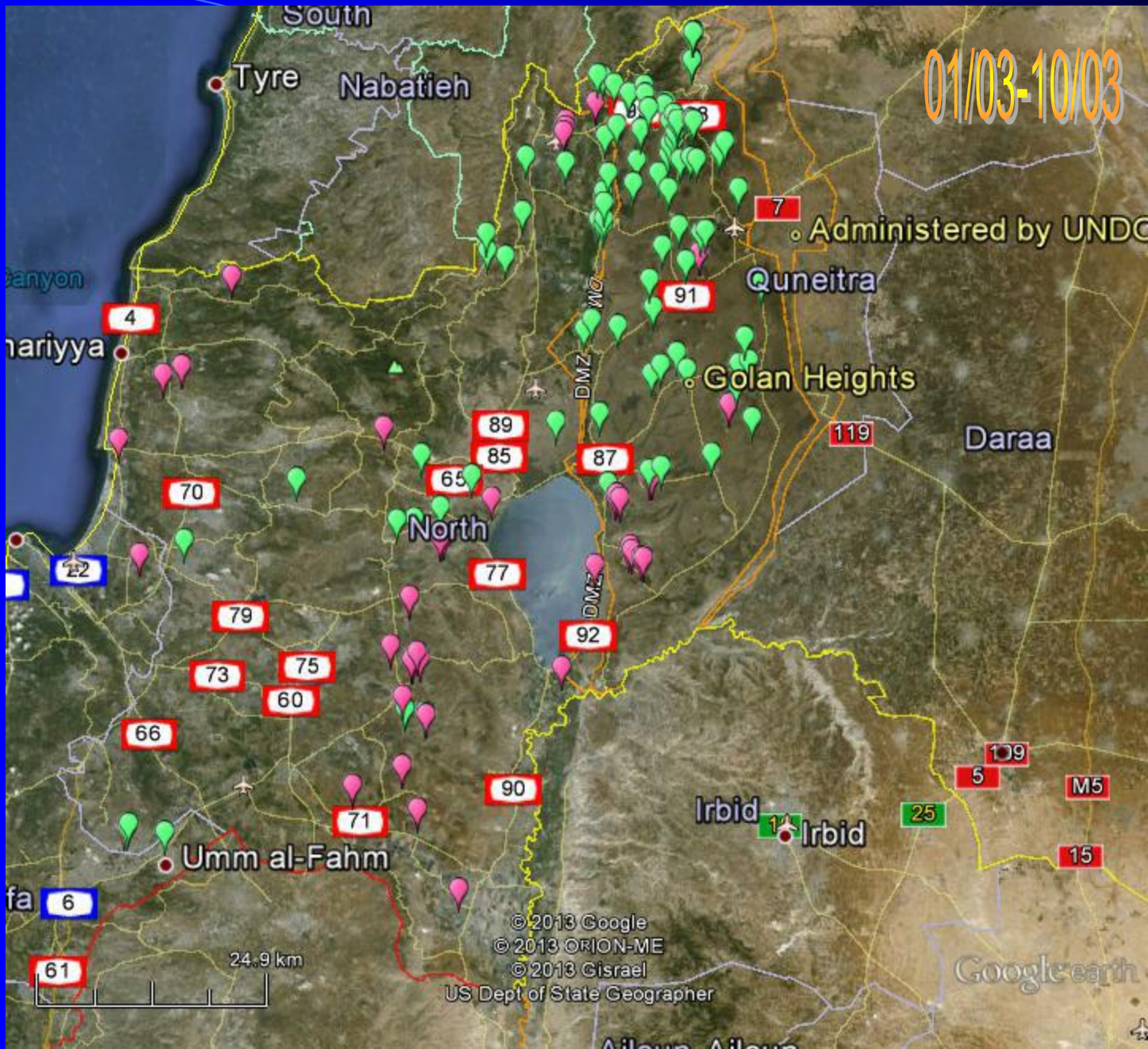


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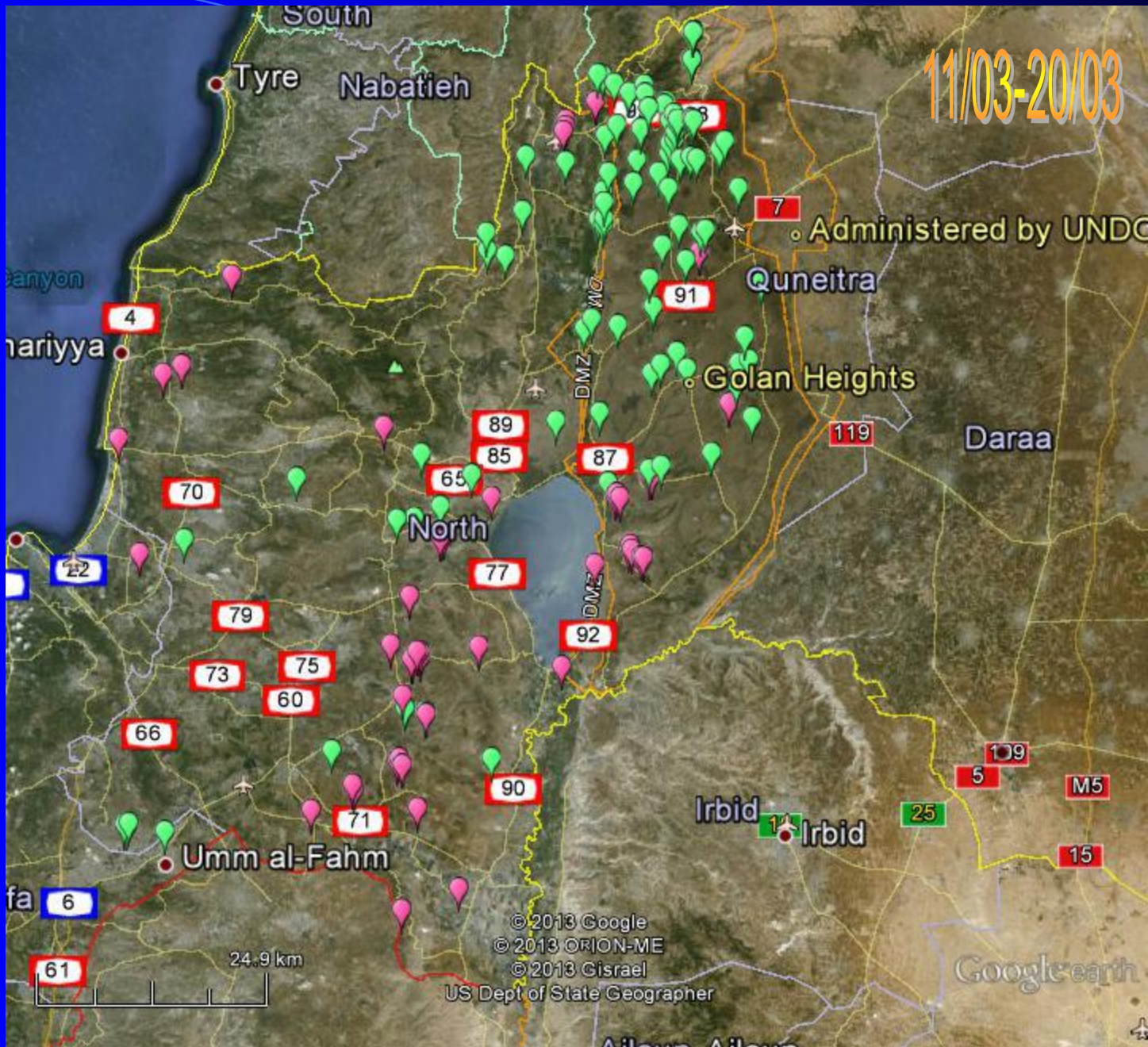
Beef
Milk





Beef
Milk

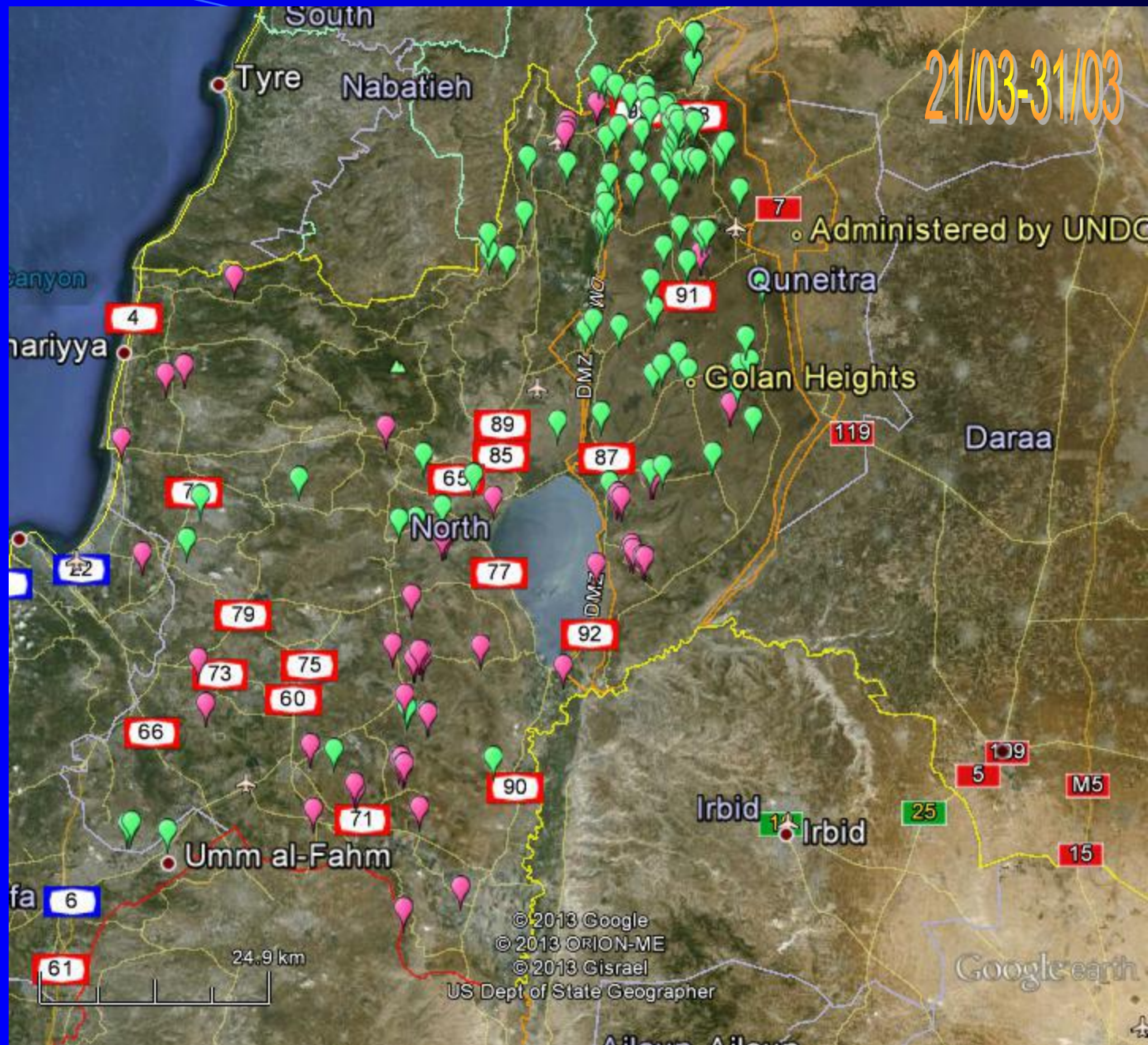




Beef
Milk



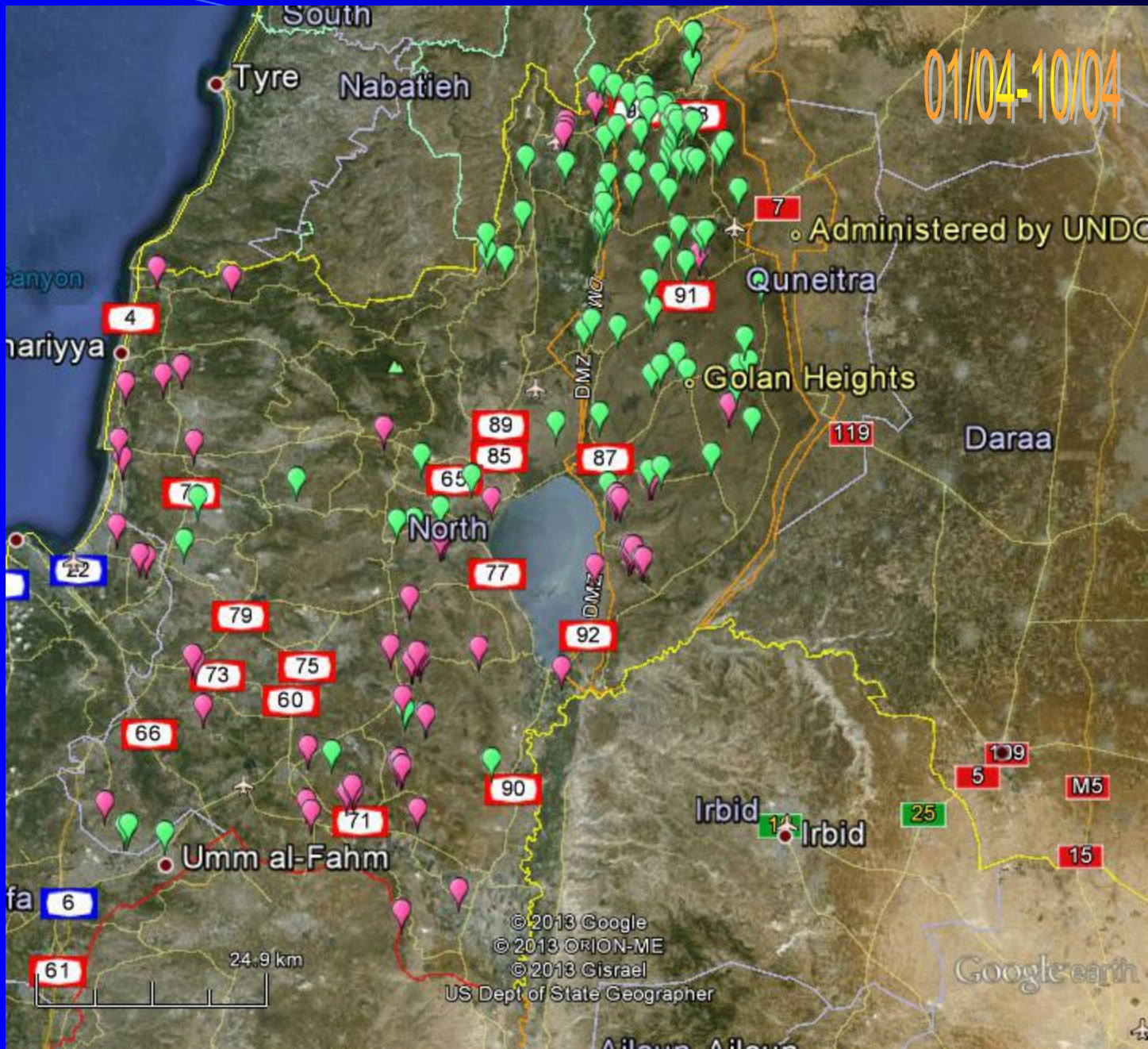
21/03-31/03



Beef
Milk

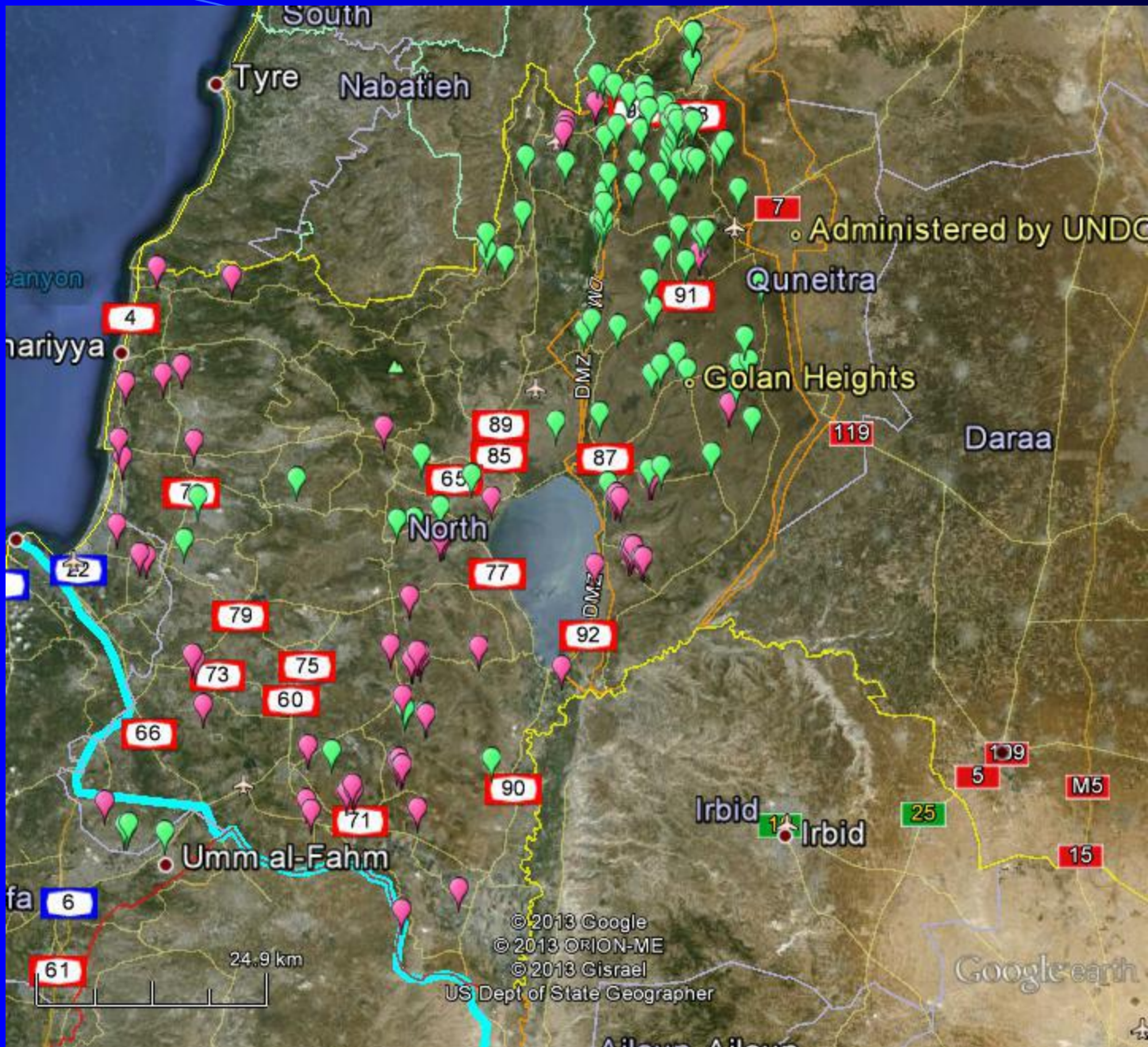


01/04-10/04



Beef
Milk

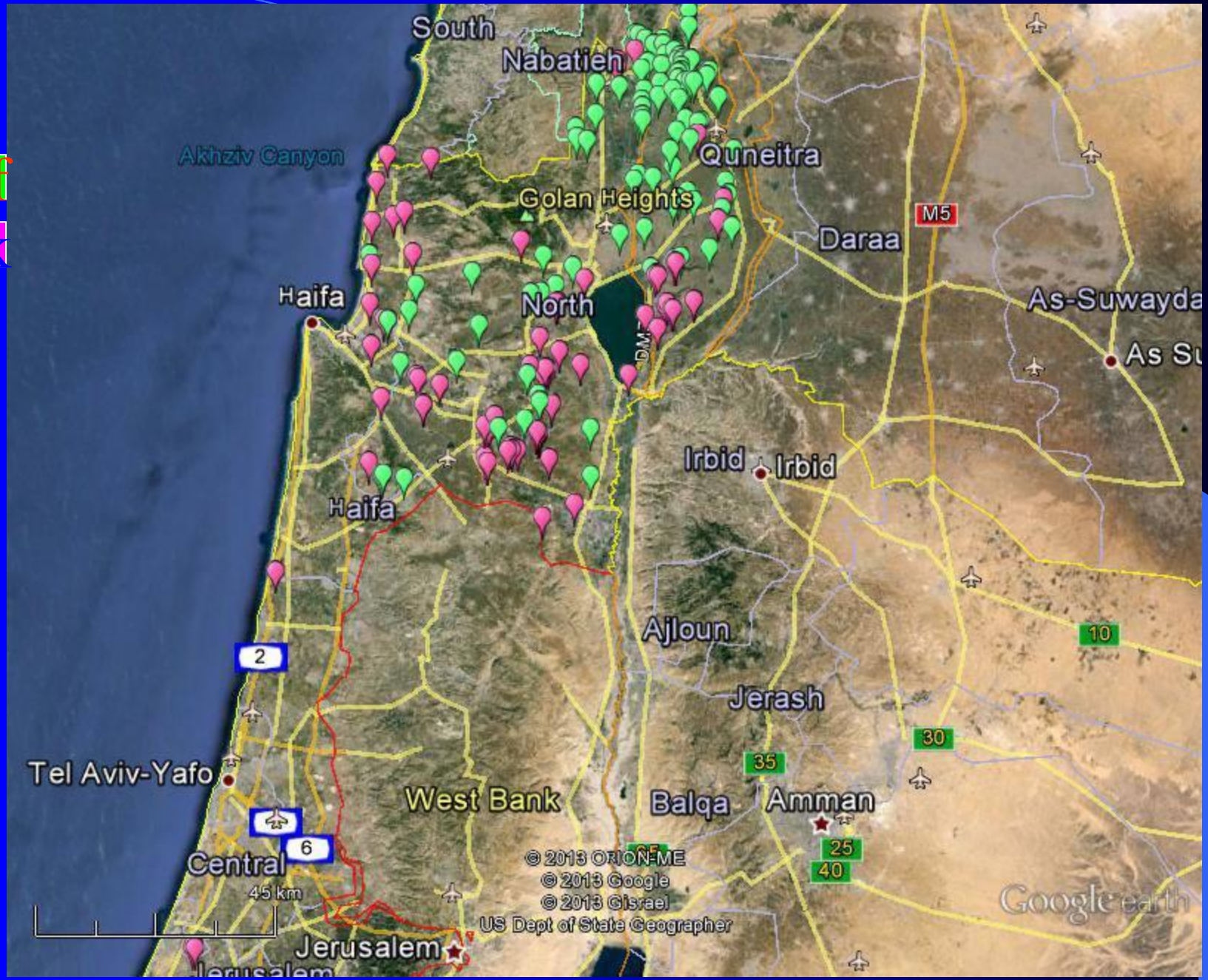




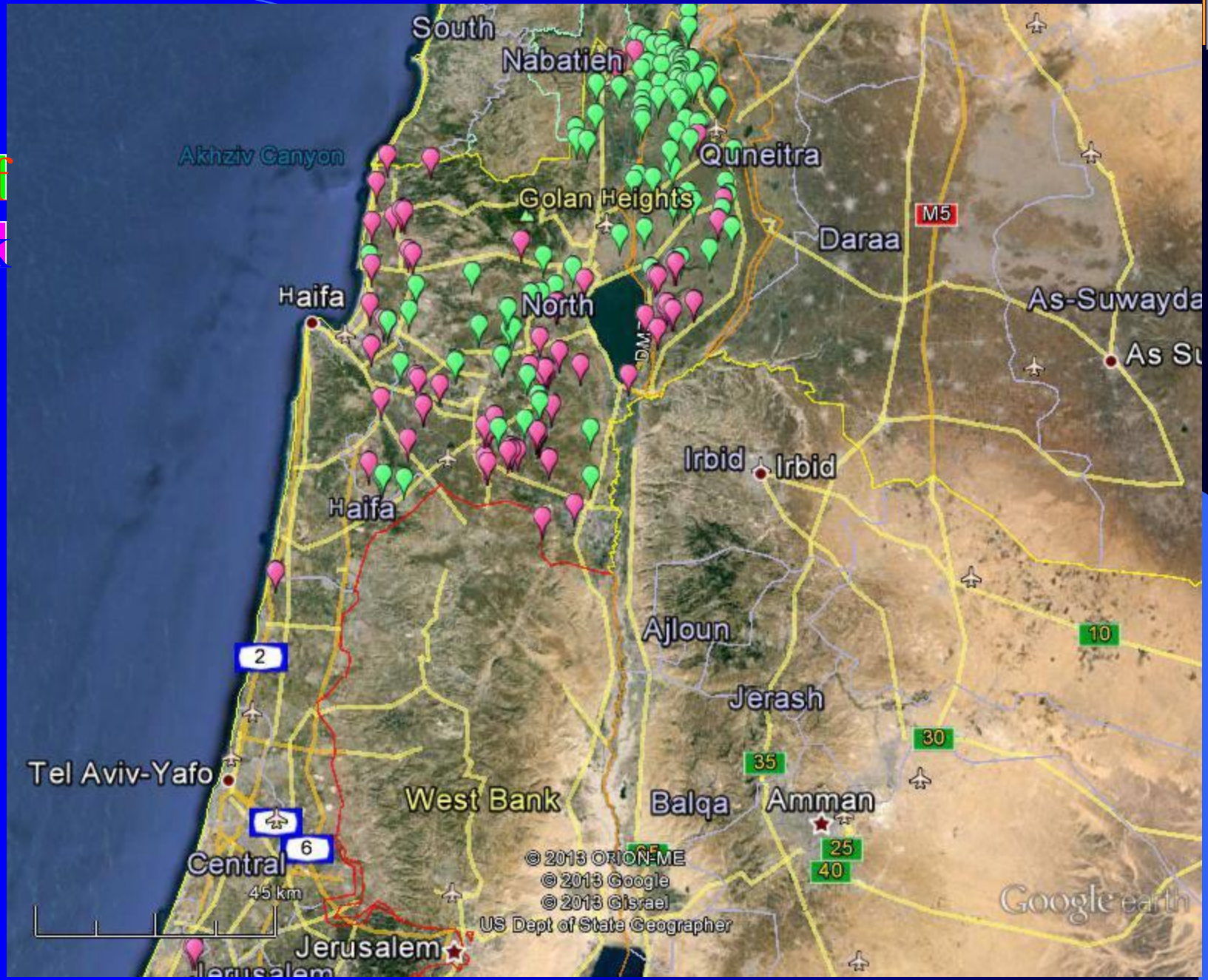
Beef
Milk



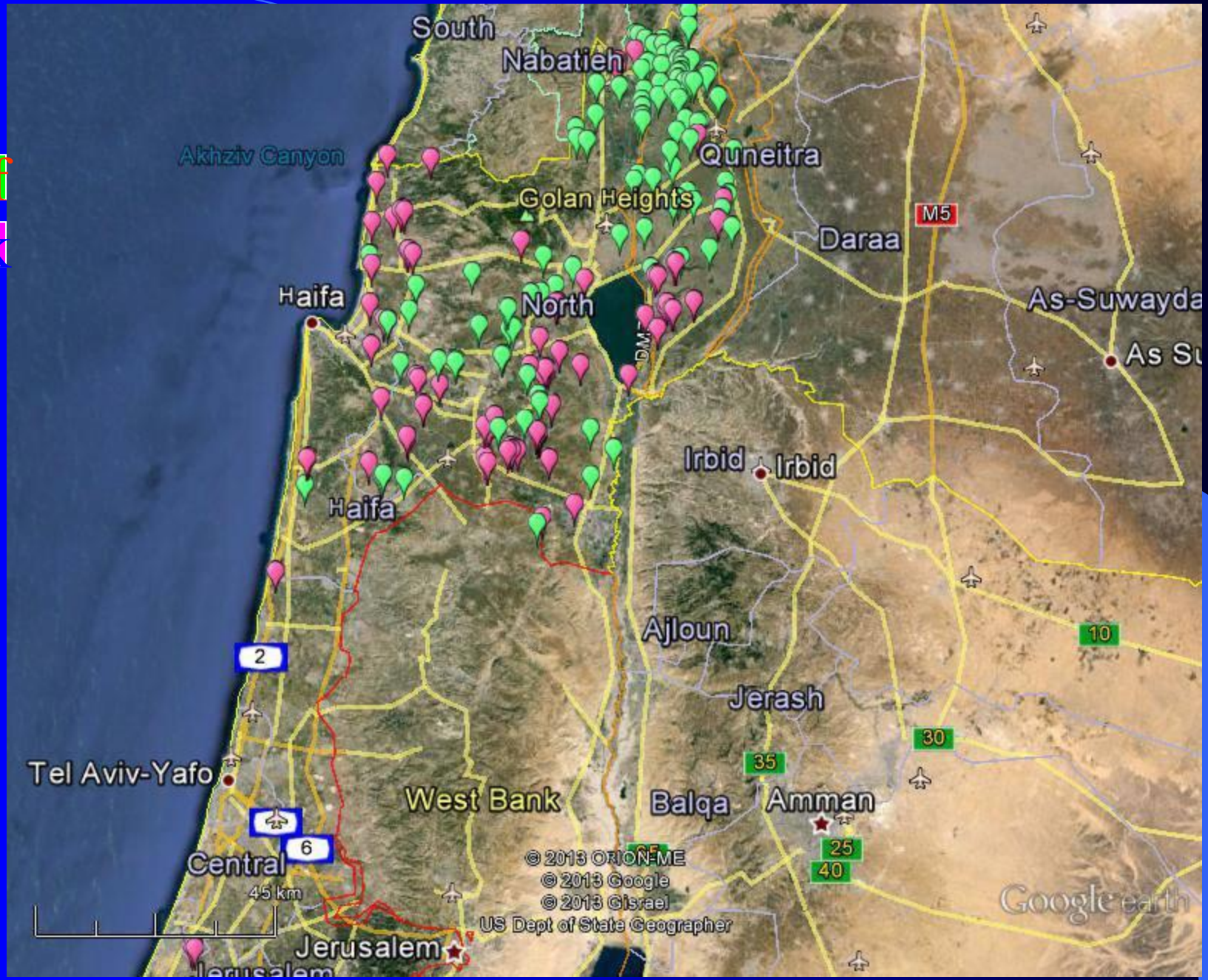
Beef
Milk



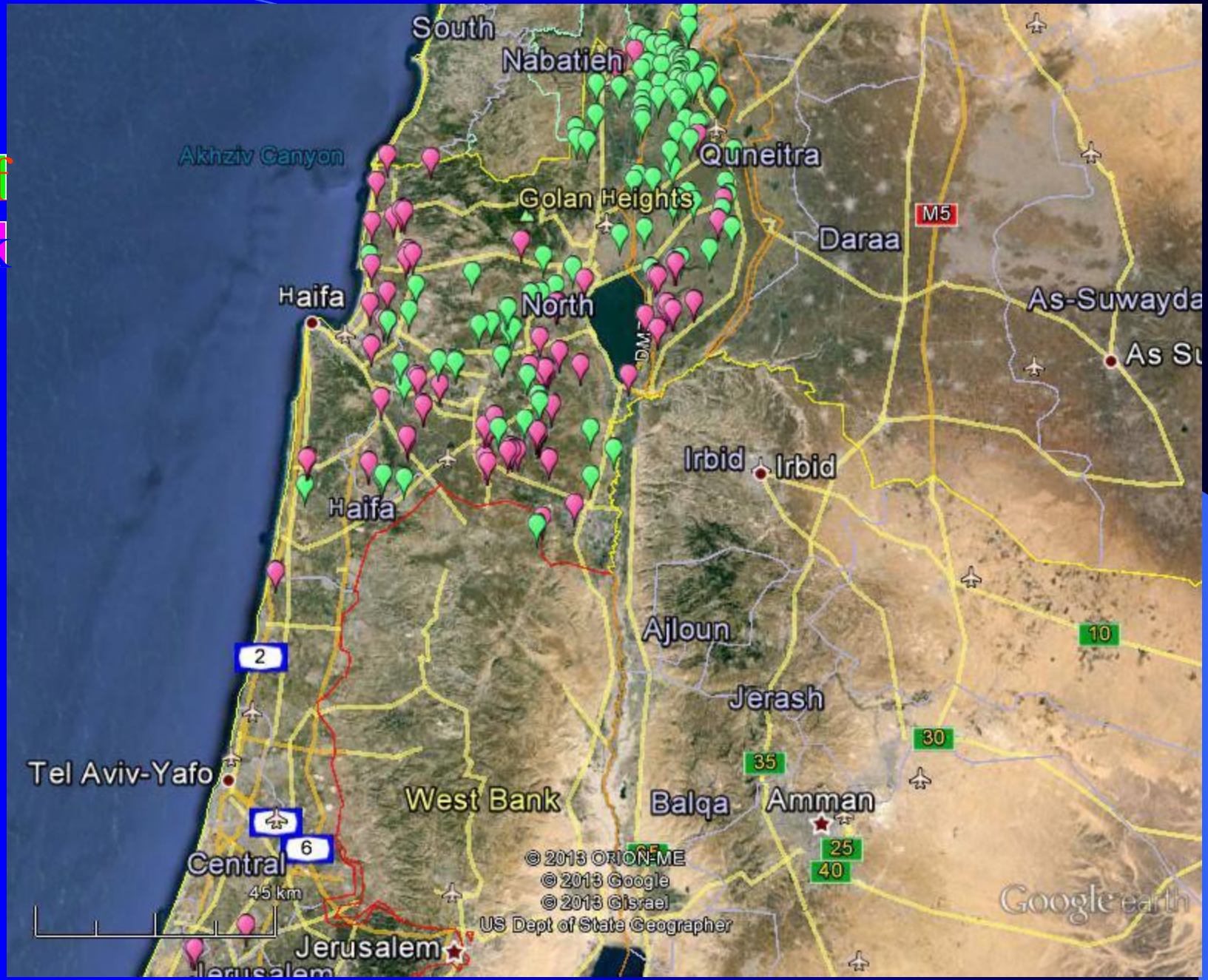
Beef
Milk



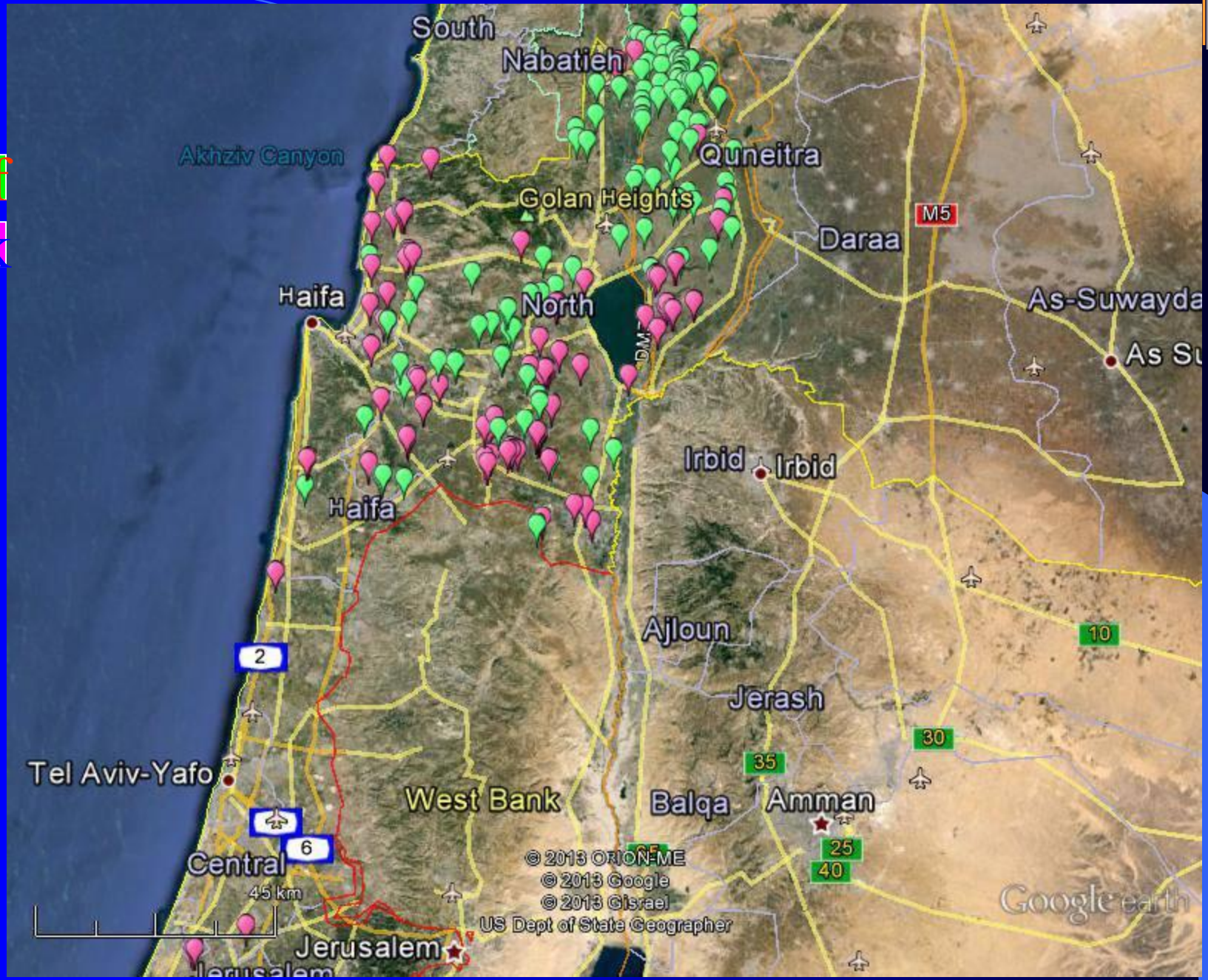
Beef
Milk



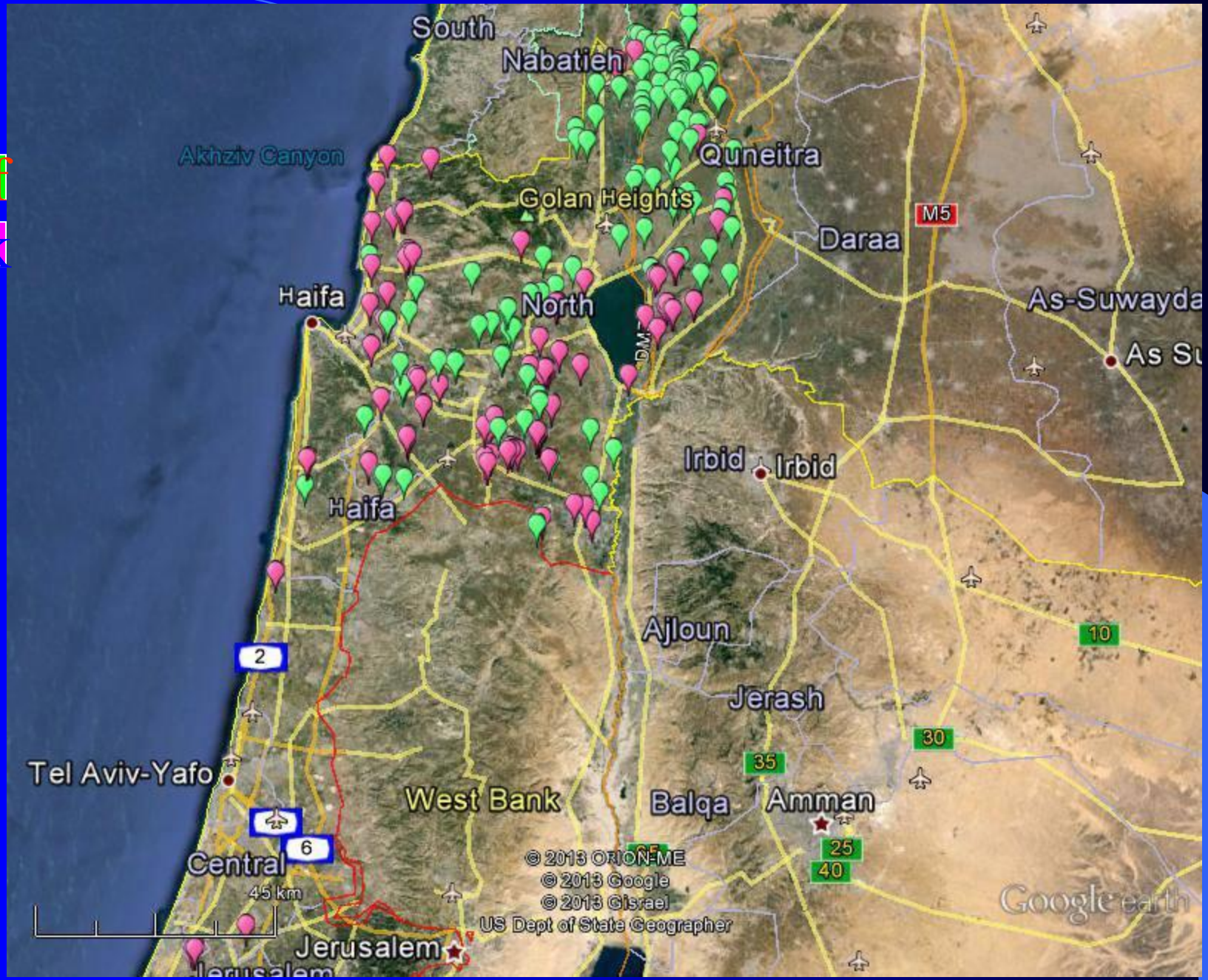
Beef
Milk



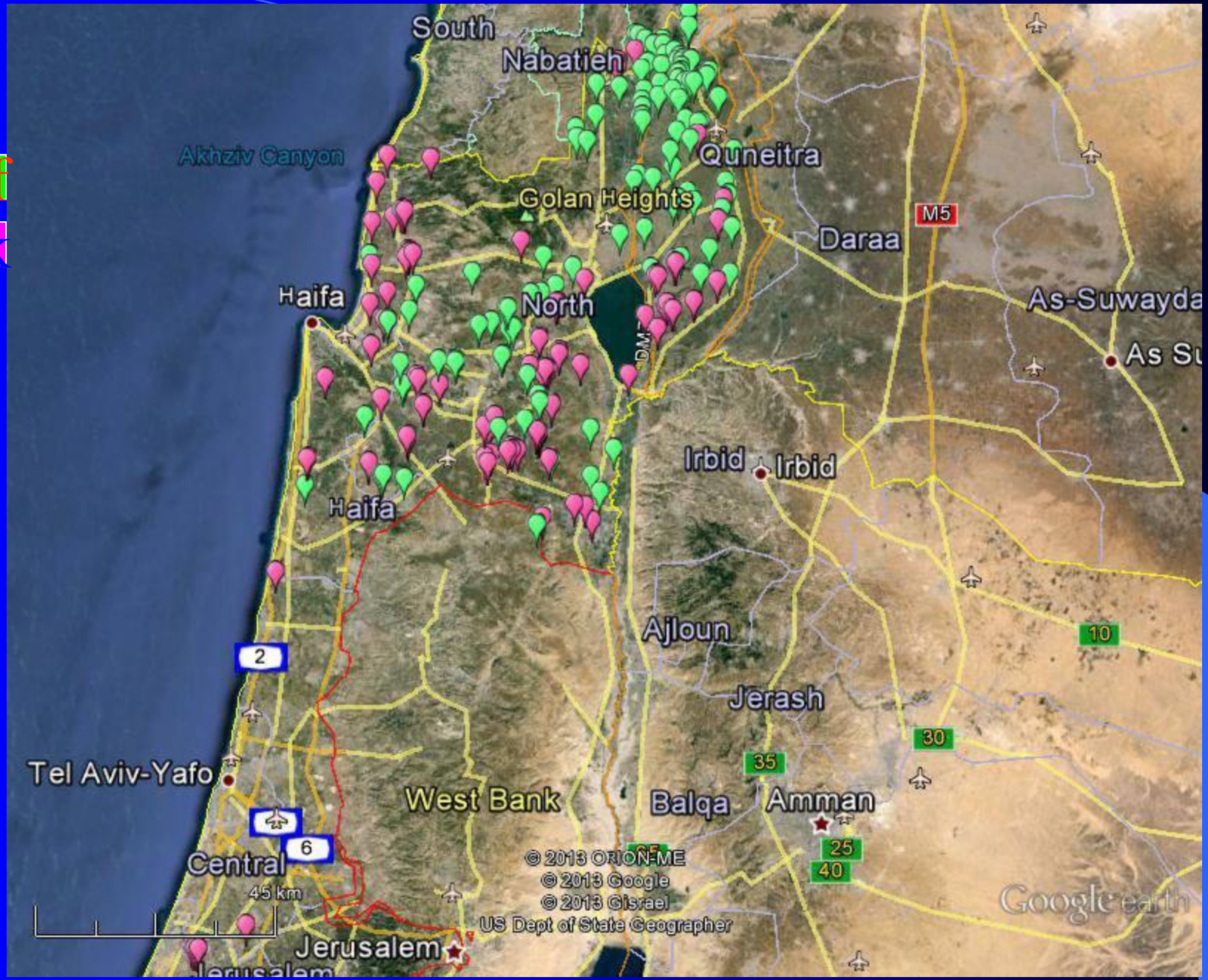
Beef
Milk



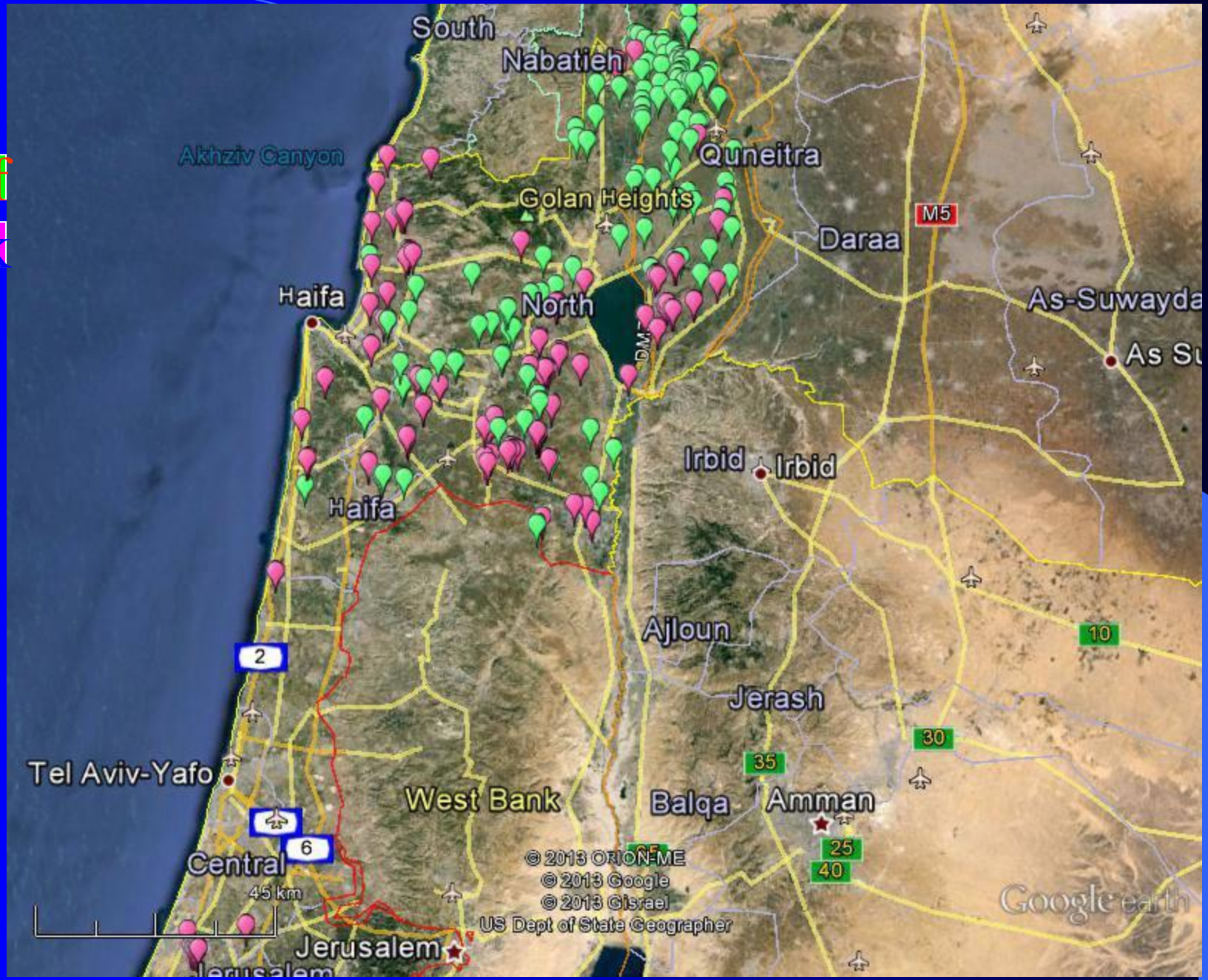
Beef
Milk



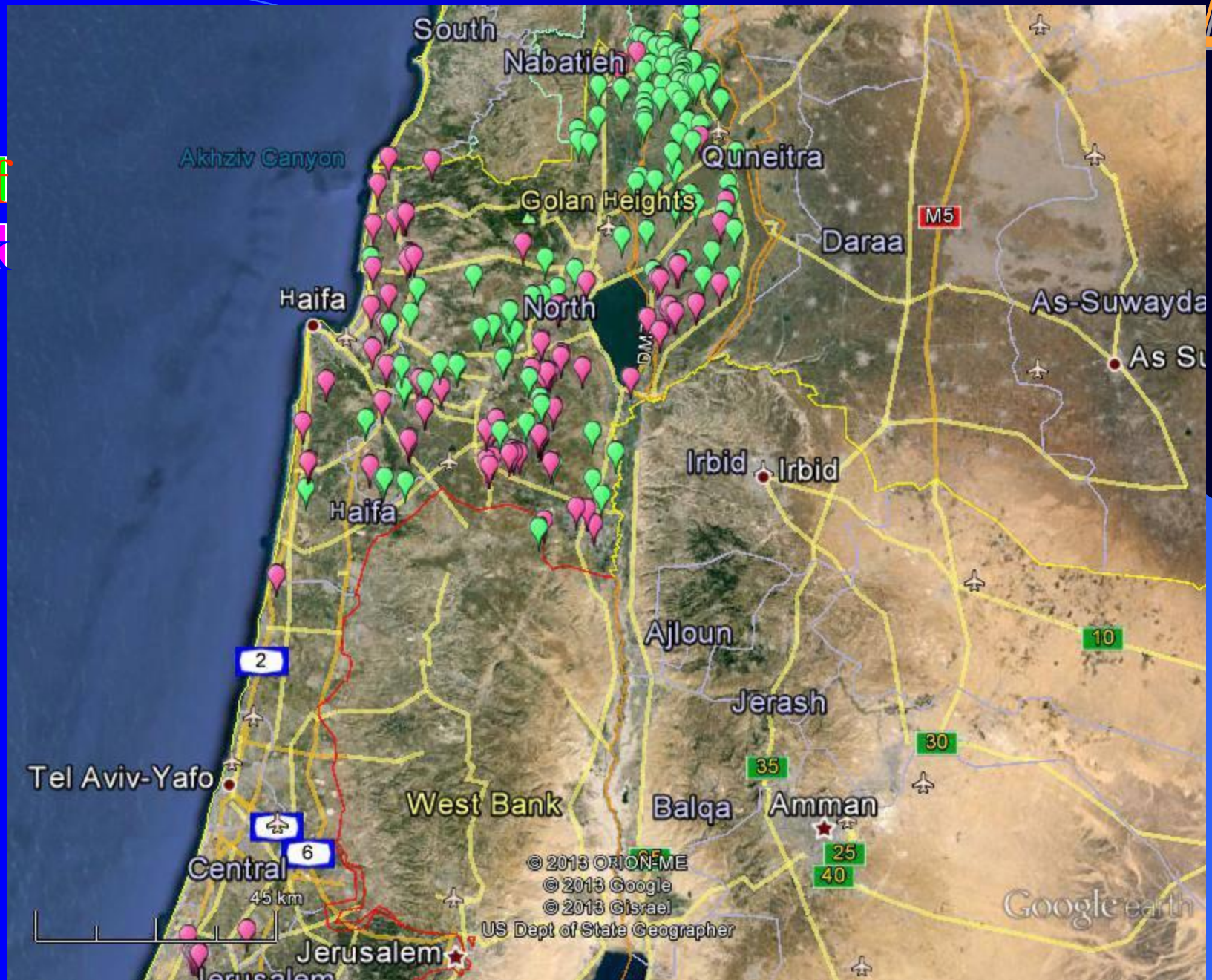
Beef
Milk



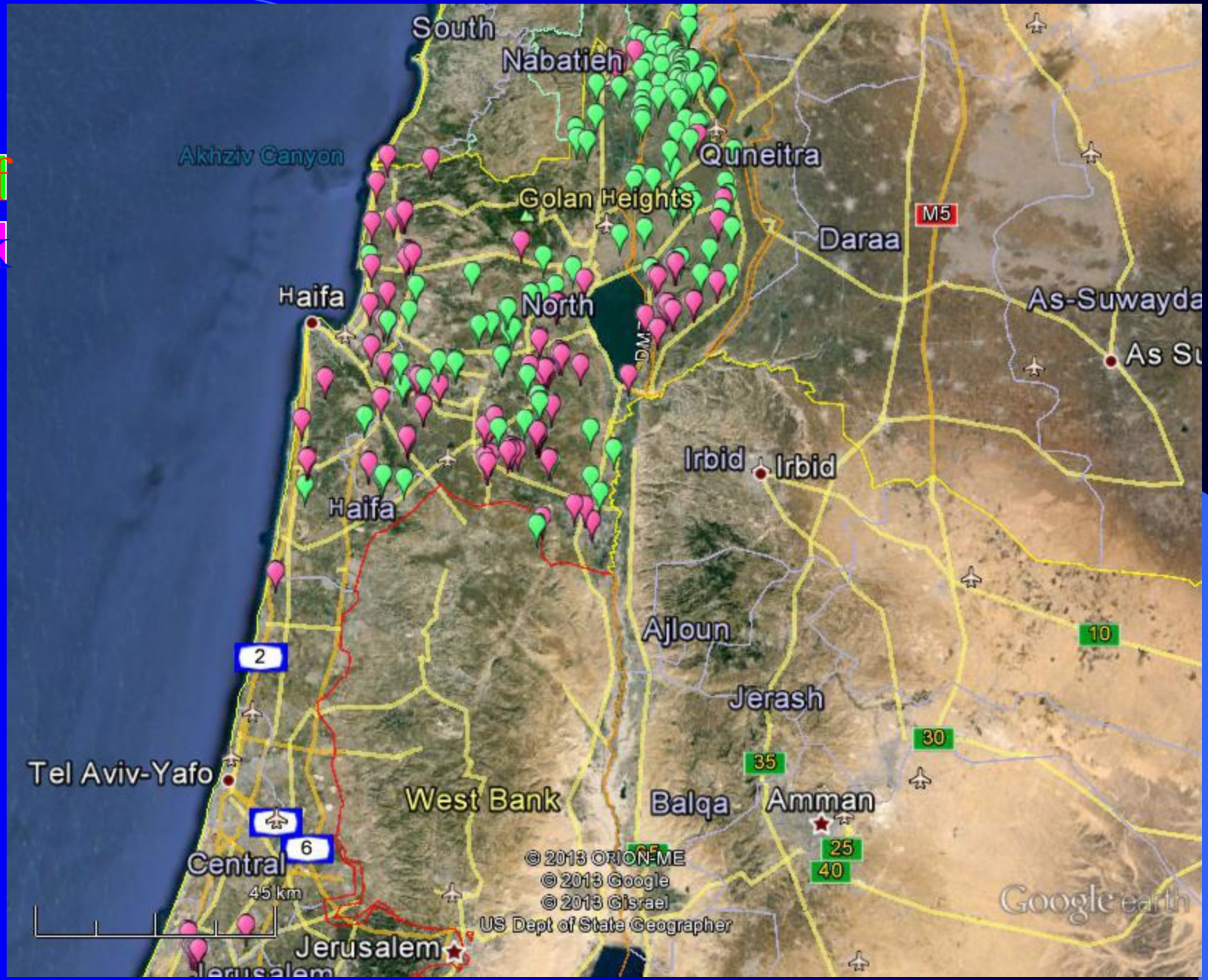
Beef
Milk



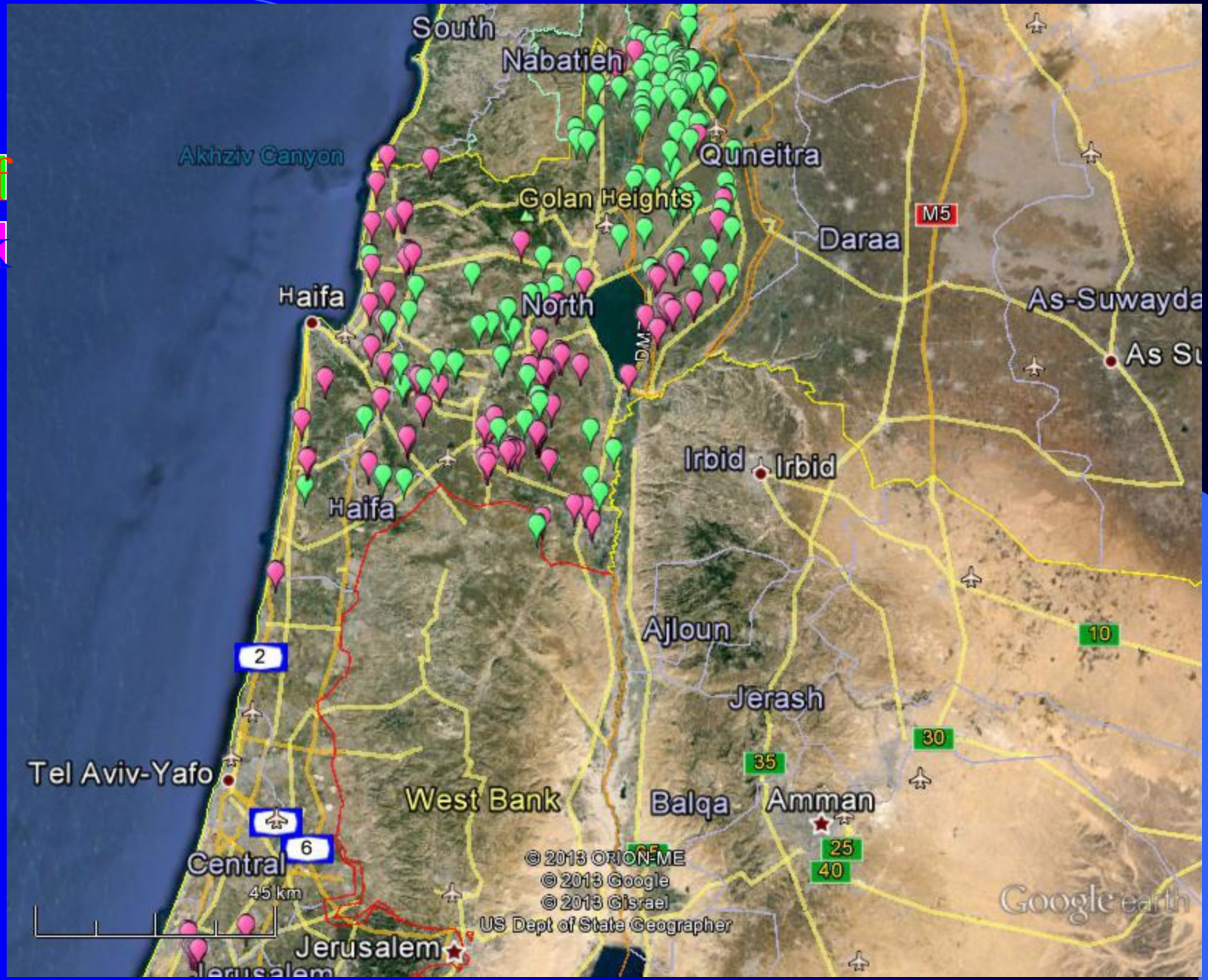
Beef
Milk



Beef
Milk

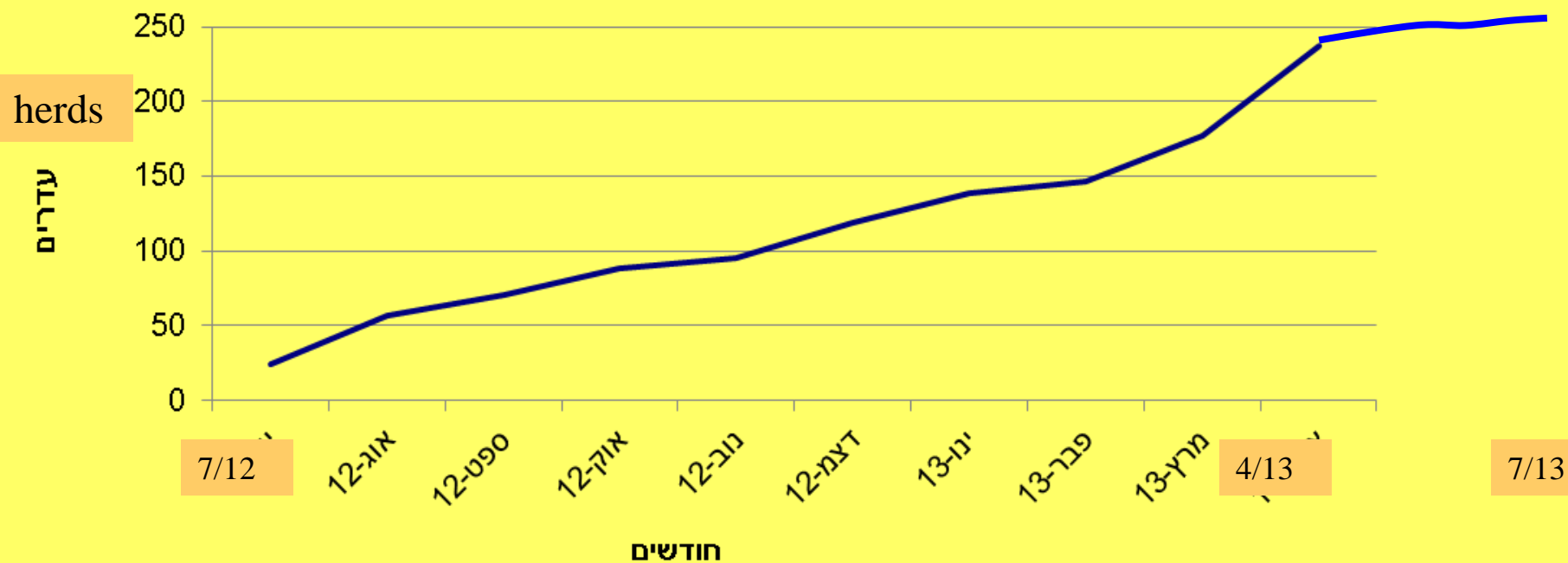


Beef
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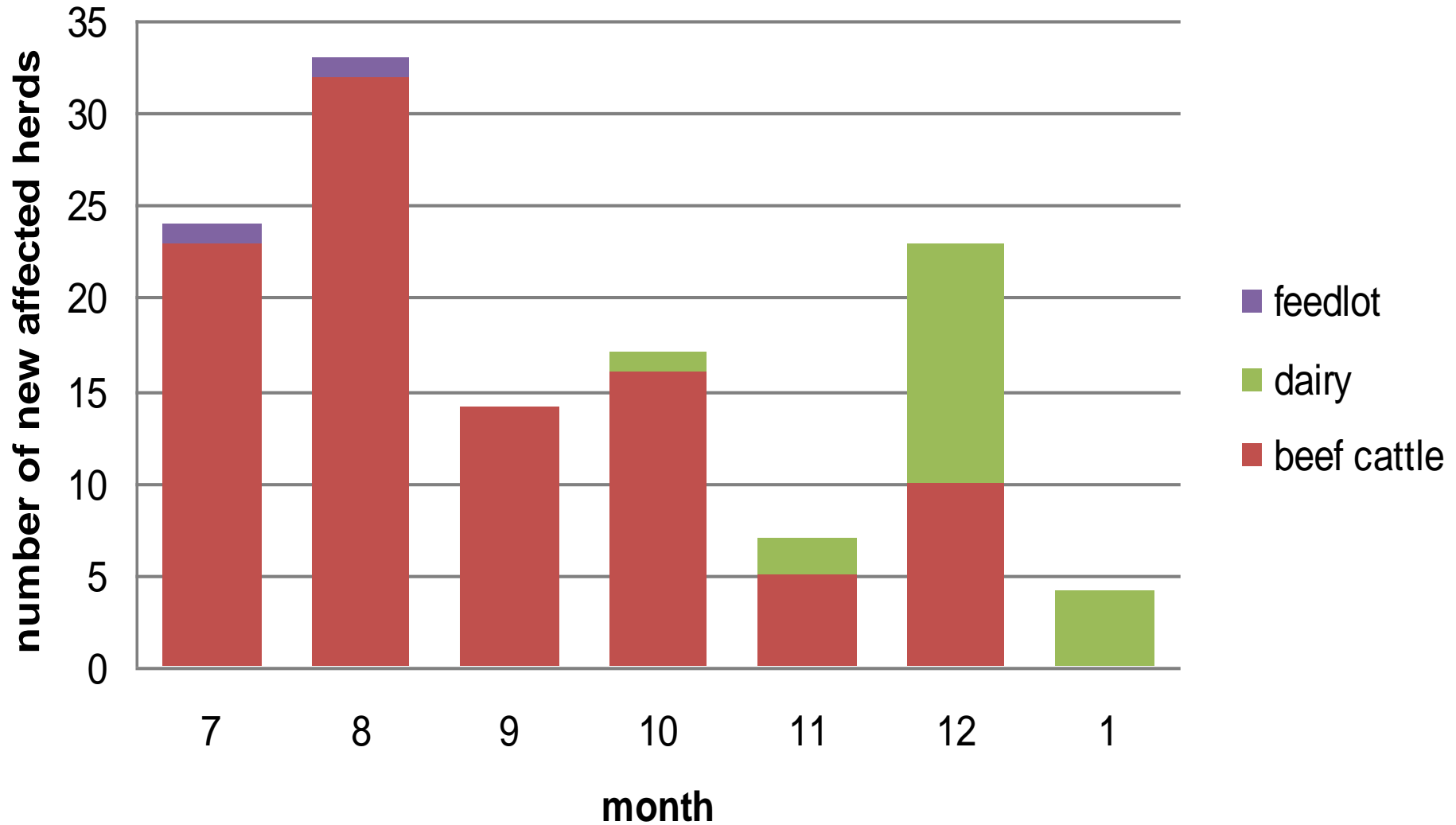


Mandatory vaccination from March 2013

Accumulative number of affected herds



Affected herds by month and by type





Descriptive epidemiology till
01/07/2013

Vaccinated

Milk	Beef	Total	District
39,226	16,577	55,803	B. Sheva
26,460	15,680	42,140	Hadera
109,650	27,266	136,916	Kanot
12,742	11,030	23,772	Acco
57,610	32,672	90,282	Gilboa
27,555	25,322	52,877	R. Pina
273,243	128,547	401,790	Total



Number of affected herds

Milk	Feedlot	Beef	Total	District
42	2	33	77	Gilboa
3	2	4	9	Hadera
20			20	Kanot
26	2	6	34	Acco
44	3	97	144	R. Pina
135	9	140	284	Total



Number of susceptible animals in affected herds

Milk	F.lot	Beef	Total	District
7845		8790	16635	Gilboa
30	100	350	480	Hadera
2227			2227	Kanot
6570	730	1205	8505	Acco
6395	1350	14802	22547	R. Pina
23067	2180	25147	50394	Total



Number of sick animals in affected herds

Milk	F.lot	Beef	Total	District
275	42	853	1170	Gilboa
4	28	19	51	Hadera
161			161	Kanot
98	10	33	141	Acco
192	45	3706	3943	R. Pina
730	125	4611	5466	Total



Mortality in affected herds

Milk	F.lot	Beef	Total	District
41	18	107	166	Gilboa
				Hadera
1			1	Kanot
		27	27	Acco
1	7	427	435	R. Pina
43	25	561	629	Total



Euthanasia in affected herds

Milk	F.lot	Beef	Total	District
53			53	Gilboa
			0	Hadera
41			41	Kanot
47			47	Acco
192	7	17	216	R. Pina
333	7	17	357	Total

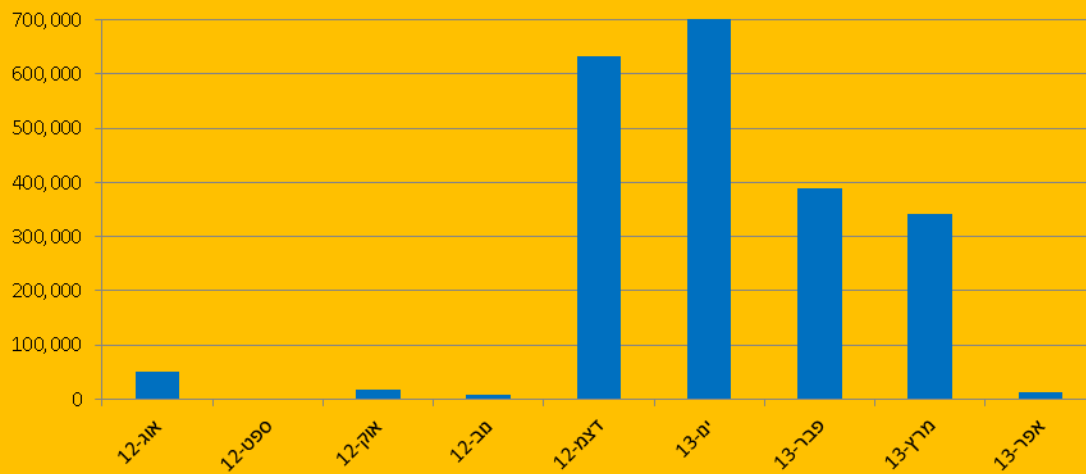


Indemnities for culled animals

Dairy cow: 2400 Eu

$$353 \times 2400 = 847,200 \text{ EU}$$

תשלום פיצויי קטרת העור



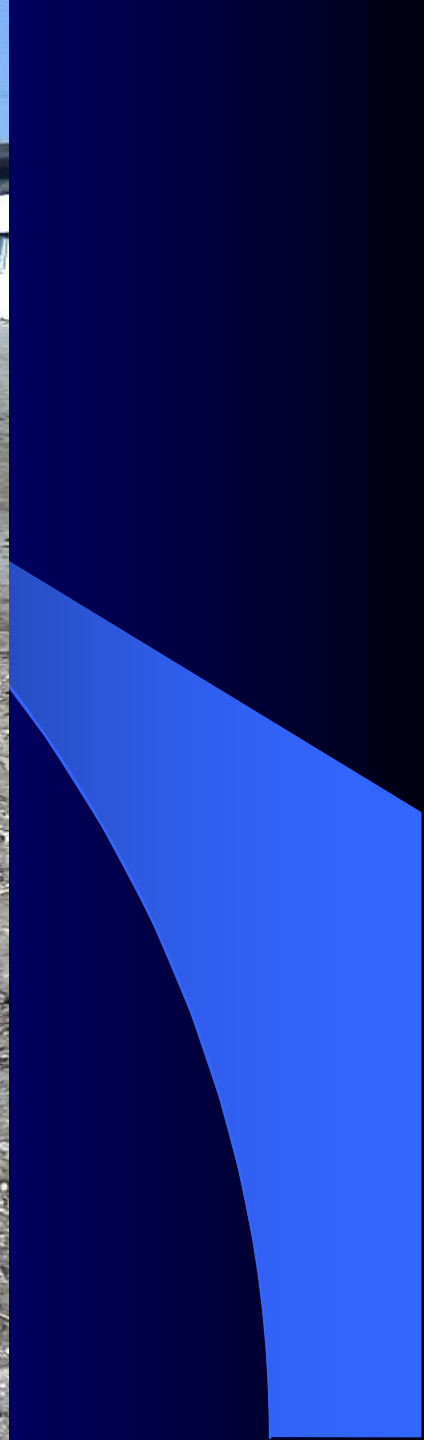
Economic losses

- ❖ Fertility
- ❖ Milk yield
- ❖ Quarantine measures
- ❖ Deaths and euthanasia
- ❖ Treatment
- ❖ Decline of animal value



Animal welfare





Lebanon notification to OIE

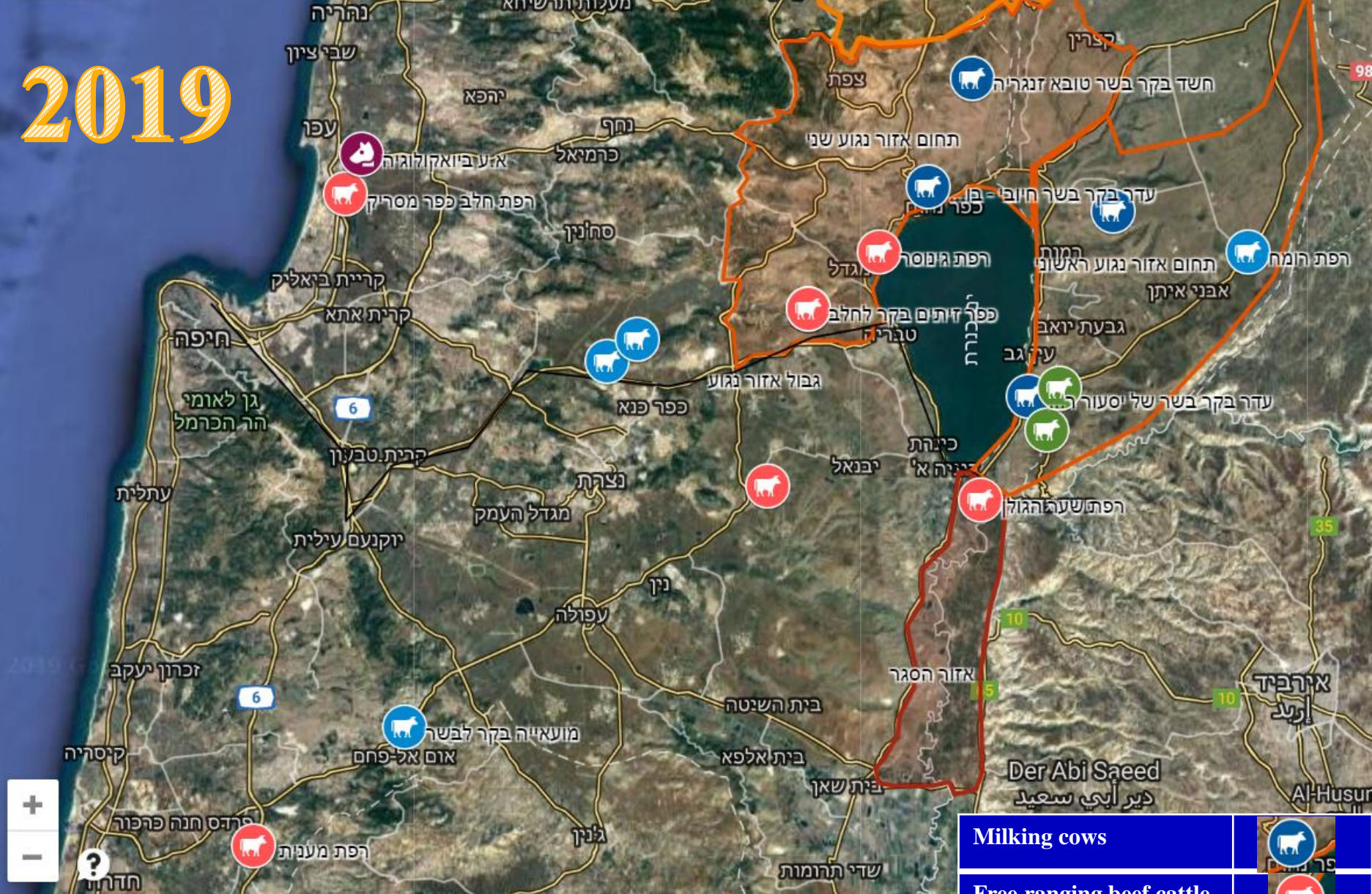
November
2012

Outbreak maps





2019



Milking cows	
Free ranging beef cattle	
Feedlot	
Incineration center	



Is it really true?

- ❖ The disease is well known (epidemiology, transmission, vaccines?)
- ❖ The disease appears only in summer.
- ❖ Pox vaccine is suitable.
- ❖ The duty of the government is to compensate for euthanized animals.
- ❖ Mandatory vaccination has to be done by VS.



Missing data

- ❖ Entomology
 - Transmission
 - Prevention
- ❖ Epidemiology
 - Behavior of disease
 - Investigations
- ❖ Vaccination
 - Proficiency
 - Safety



Sheep-pox is a contagious disease caused by Capripox virus. It is characterized by skin and mucous membrane lesions, but the systemic reaction may lead to animal death. Vaccination is the only prevention method to control the high level of morbidity and mortality caused by this disease.

COMPOSITION:

Each dose of the vaccine contains:

Modified Sheep pox virus,
RM/65 strain at least... .. $10^{3.0}$ TCID₅₀*
(*Tissue culture infective dose 50%)

INDICATIONS

Prevention of sheep pox.

METHOD OF IMMUNIZATION

*Primer vaccination.

-One injection above the age of 3 months.

-If vaccination is performed on less than 3 months old lamb, a second injection must be given 6 months later.

*Yearly boosters.

If necessary sheep pox vaccine may be administered to pregnant ewes, which will transfer immunity for young lamb during the first 3 months of age.

METHOD OF USE AND DOSAGE

*Cold and sterile normal saline (diluent) is used to reconstitute the pelleted freeze-dried vaccine. The reconstituted vaccine must be protected from light and heat and be utilized immediately (limit time is 2 hours).

*Use 100 ml of diluent for vial of 100 doses, and 50 ml for 50 doses vial

* Inject 1 ml subcutaneously per animal into the sternum area, where there is no wool, behind the elbow.

*A small nodular reaction may appear at the point of inoculation (TAKES), which disappears later.

RECOMMENDATION

*Never use a syringe and a needle sterilized with a chemical agent.

*Use aseptic technique.

*Reconstitute the vaccine immediately before use and destroy any unused portion.

STORAGE

The vaccine can be stored at: + 2°C to + 8°C for two years.

PRESENTATION

Vials of 50 doses and 100 doses.

Vaccine 2006-2013

Sheep Pox RM/65

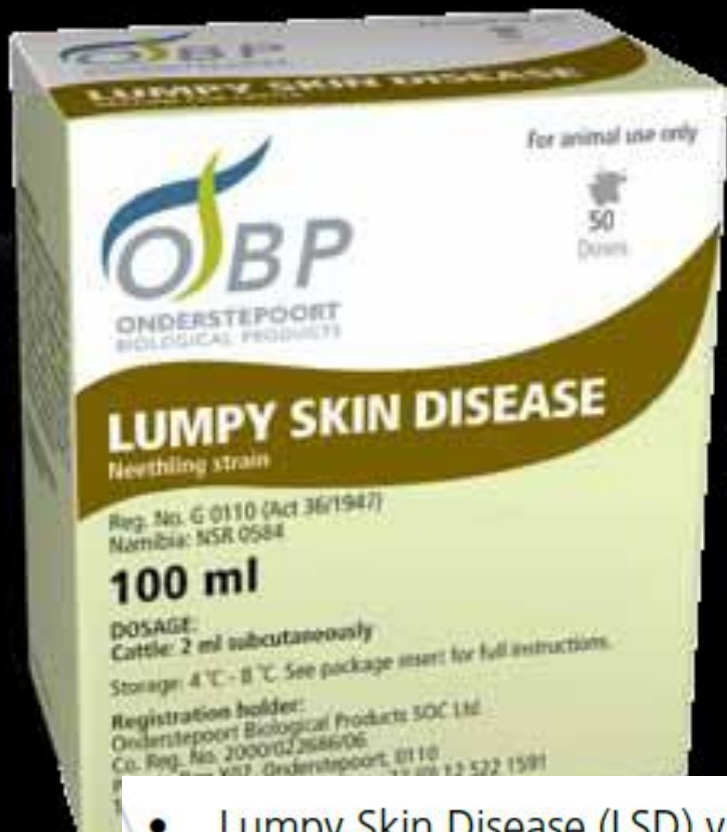
“New” vaccines

- ❖ X 10 POX
 - JOVAC
 - Attenuated
 - Known in Israel
- ❖ Neethling LSD
 - South Africa
 - Attenuated
 - Neophobia

**Safety tests –
no problems**

**Mandatory vaccine for
all cattle from March
2013-2016 and from
August 2019**





Neethling Vaccine

- Lumpy Skin Disease (LSD) vaccine contains the proven **Neethling strain**
- Protect bulls against virus excretion in the semen
- Ensures sufficient protection against field strains of Lumpy Skin viruses
- Stimulate immunity in 7 - 14 days
- The vaccine is safe to use in PREGNANT animals

Recommendations

Calves: From 4 - 6 weeks of age

Adults: Yearly vaccinations ensure good



"Neethling disease"

- ❖ Vaccine reaction
- ❖ What is preferable?
- ❖ Less reactions in already vaccinated with POX 1.
- ❖ New lab possibility to differentiate between vaccine and field strains.



Dr. Shlomi Levi

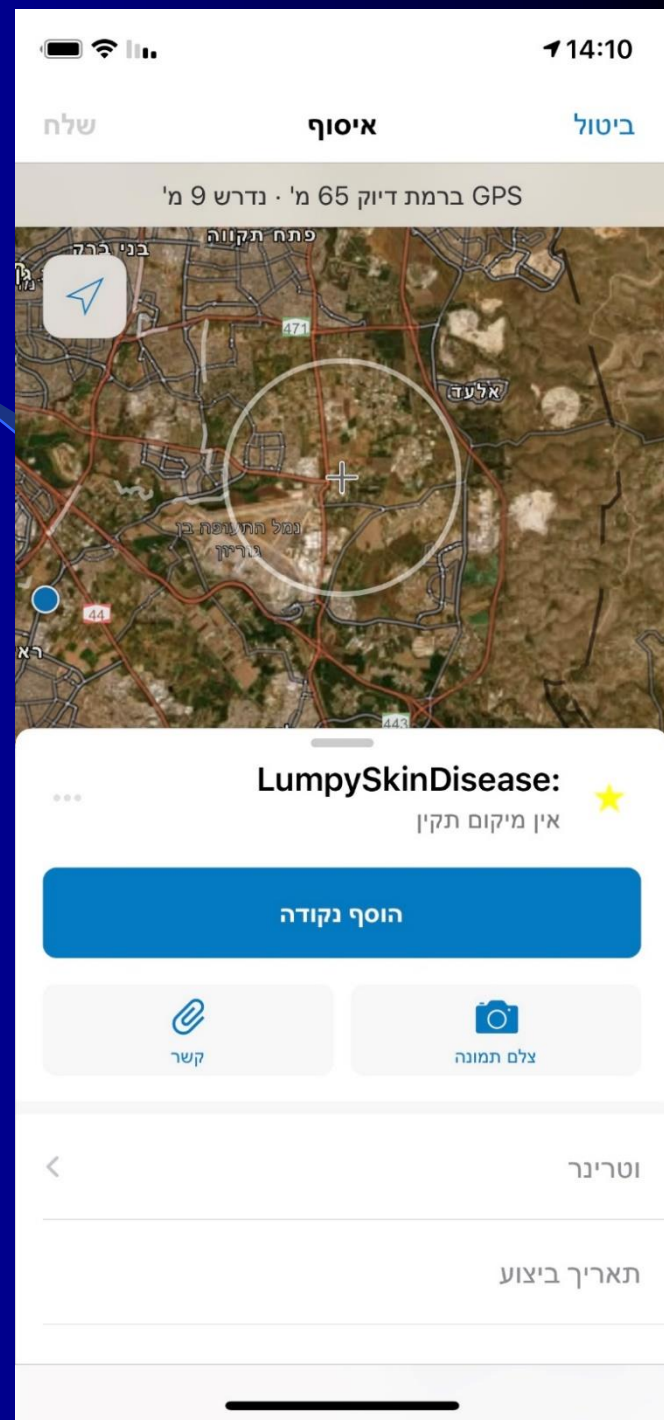




New tools that can assist in LSD surveillance and prevention



New application for LSD vaccine reporting



Finding affected herds/animals with a drone



Advantages:

- Possibility of scanning large areas in short time
- Possibility to reach remote herds in open fields
- Possibility to track hidden animals



Advantages:

Overcoming obstacles



Advantages:

Possibility to spot affected animals



Advantages:

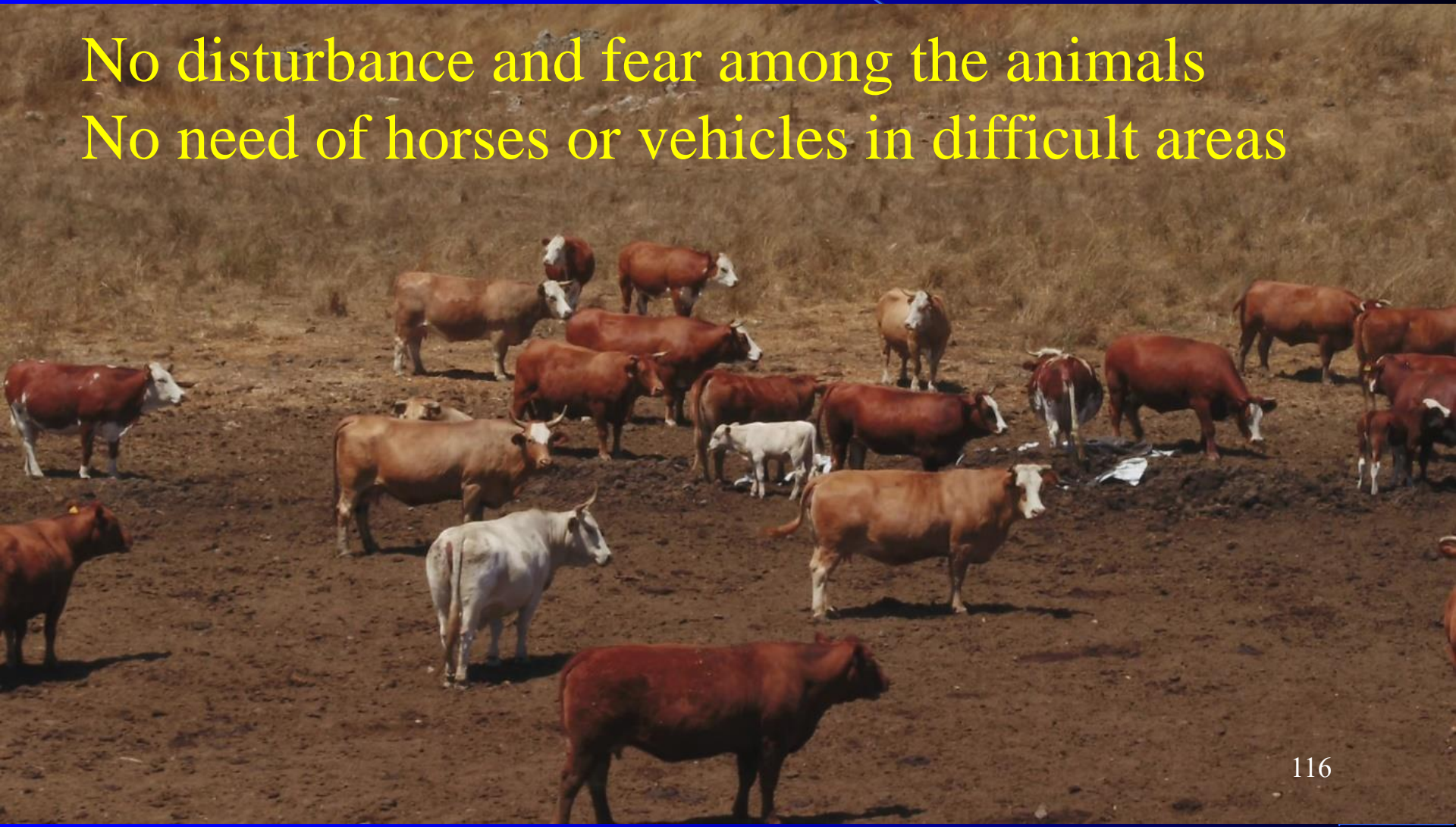
Possibility to identify the animals by their number.



Advantages:

No disturbance and fear among the animals

No need of horses or vehicles in difficult areas



Advantages:

Security and welfare of the staff
(snakes, mines, weather etc).



Advantages:

Documentation by photos and videos

No Animals, Aircrafts or Veterinarians were hurt in the production of this film!



Disadvantages:

- Exceptional weather conditions
- Short time of battery
- Price
- License
- Permits in some areas (army etc.)
- Skilled operators



Israel can be the Gate Keeper of Europe



Acknowledgements

- ❖ Field Veterinary Services
- ❖ Private and Hachaklait field veterinarians
- ❖ Farmers
- ❖ Virology Division – Kimron Veterinary Institute
- ❖ Researchers



Thank you for listening

