Software Surveillance of Farms, Farmers and Food

Martin Dodge
University of Manchester

Rob Kitchin
National University of Ireland, Maynooth

Association of American Geographers Annual Meeting, Las Vegas, 26th March 2009

Rural idyll / agro-industrial landscape

The Cornfield, John Constable, 1826

- Social construction of the ‘rural’ in popular imagination of Englishness
- Appears as the opposite of urban and modern
- Natural, peaceful & quiet, freedom

- Yet, little or nothing of ‘nature’ in the English countryside
- Materiality results from political economy – fields, land-ownership, animals present/not present, etc
- Range of distinct social problems and dangers. A fearful place, perhaps, if you are ‘out of place’
- Highly surveilled and governed

WATCH LIVE BBC News 24

Last Updated: Wednesday, 14 November 2007, 21:21 GMT

E-mail this to a friend Printable version

More culls in bird flu outbreak

About 22,000 turkeys on four premises are being culled as a precaution, after the virulent H5N1 strain of bird flu was found in turkeys on a Suffolk farm.

The farm prepared birds for the Christmas market

Officials said it was not yet known if the birds had contracted the virus.

A cull of 6,500 birds is also nearing completion at Redgrave Park farm, near Diss, where the infection was discovered on Sunday.

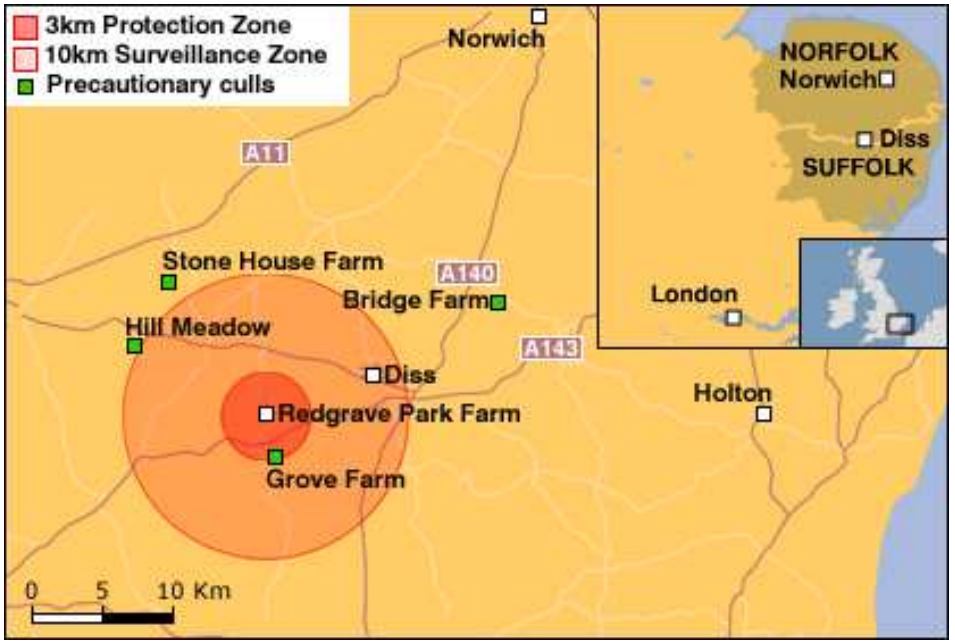
Gressingham Foods' subsidiary Redgrave Poultry, which runs all five sites, said they shared the same farm staff.

A "direct link" had thus been established between them, it said.

A 3km (1.9 mile) protection zone and a 10km (6.2 mile) surveillance zone, where movement of birds is restricted and poultry must be isolated from wild birds, is in place around Redgrave Park.

One of the four sites is within the protection zone and the other three lie within the wider restricted zone, covering much

> **"This is a precautionary measure taken to prevent any potential spread of the disease"**



Hybrid countryside(s)

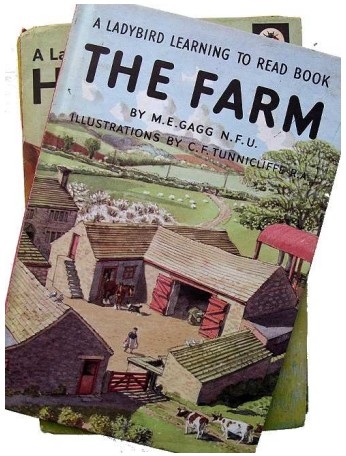
- Murdoch (2003: 274) “The countryside is hybrid… it is defined by networks in which heterogeneous entities are aligned in a variety of ways”
- Woods (2007: 495), “it is made (and constantly remade) through the entanglement and interaction of the social and the natural, the human and the non-human, the rural and the non-rural, and the local and the global.”

- The question for us is in what ways are sensors/id tags, surveillance databases and software simulations becoming entangled in this production of hybrid countryside(s)

- What difference does code make in the countryside, particularly in automated surveilling of farming practices and rural landscapes
- Rural spaces are interesting, in part, because they are under studied in terms of pervasive computing and software surveillance

Approaching code – Some analytical concepts

- Matthew Fuller and Lev Manovich defining ‘software studies’
- “Software Studies uses and develops cultural and theoretical approaches to make critical and speculative accounts of the objects and processes of computer science.”
- http://lab.softwarestudies.com/2008/07/software-studies-book-series-mit-press.html
- Nigel Thrift’s ‘automatic production of space’ and ‘technological unconscious’
- Steve Graham’s ‘software sorting’
- Pete Adey: ‘software-simulated space’ and ‘anticipatory governance’
- “software simulations make the future present and actionable-upon by alerting the users to future possibilities” (25)
- Stuart Lane’s ‘surveillant science’
- Our notions of ‘code/space’, ‘coded space’



Making food more knowable

- regulating safety in the food supply chain by coding livestock (and subsequently parts of livestock) so they are traceable from ‘farm-to-fork’

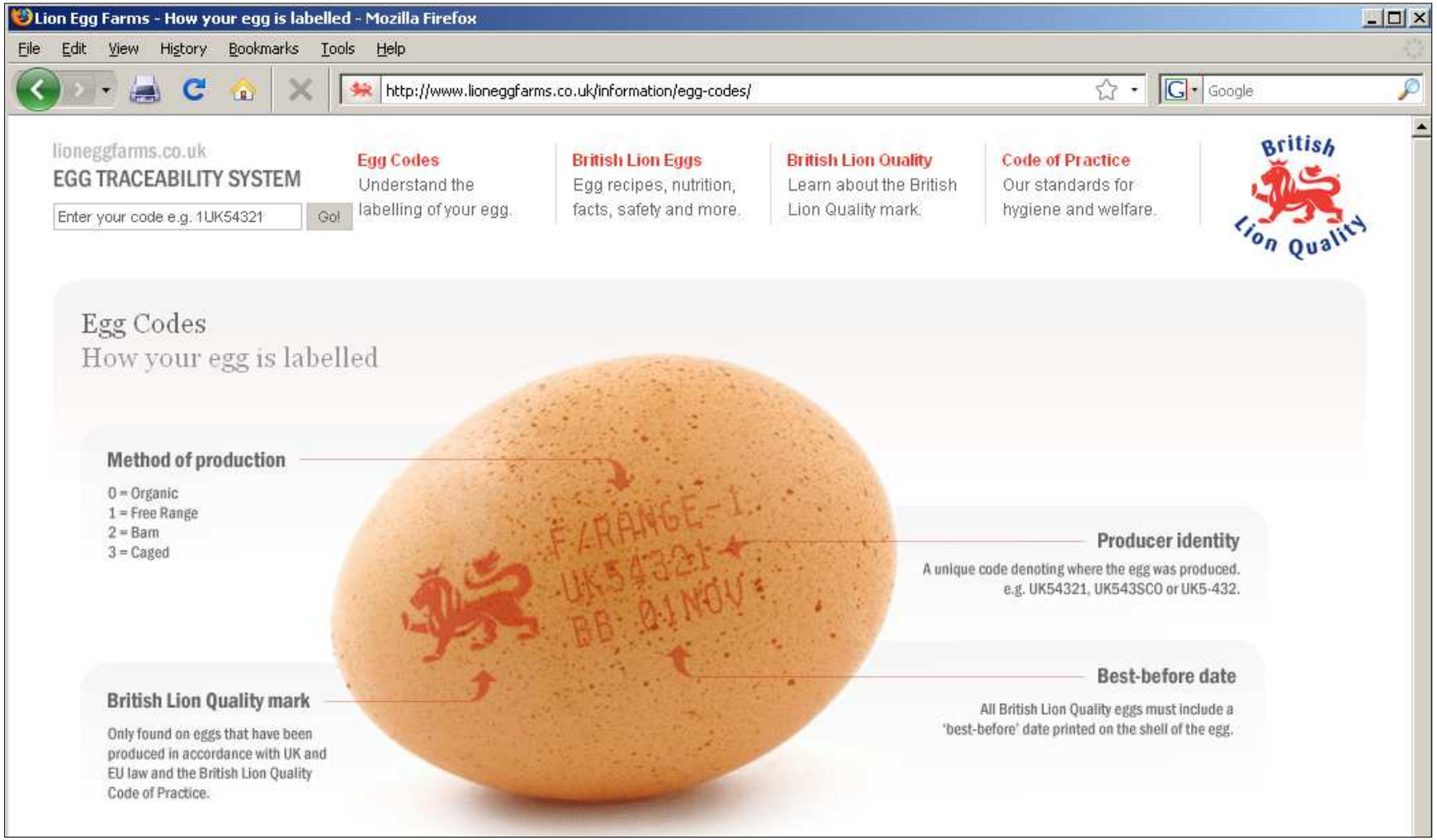
- enhancing automation of farm labour by taking ‘precision farming’ to the animal. Stockperson become screen-worker

Abstracting and tracking cattle ‘externally’

- Safety with life cycle traceability
- Made machine-readable

- Cattle tracking service
  - check which animals are present on a holding
  - check where an animal has been during its life
  - trace animals exposed to a disease risk
  - give assurances to buyers about an animal’s life history, and so
  - strengthen consumer confidence in beef

Ethical eating – 'google your grub' as consumer empowerment



Cow shed as Code/Space?

- Automatic milking systems
- Huge capital investment
- Code changes practices for cows (on-demand, recognised individually) and stockperson
- Controversial as it appears so ‘unnatural’
- No-grazing systems mean cows ‘disappear’ from the countryside

You have full control

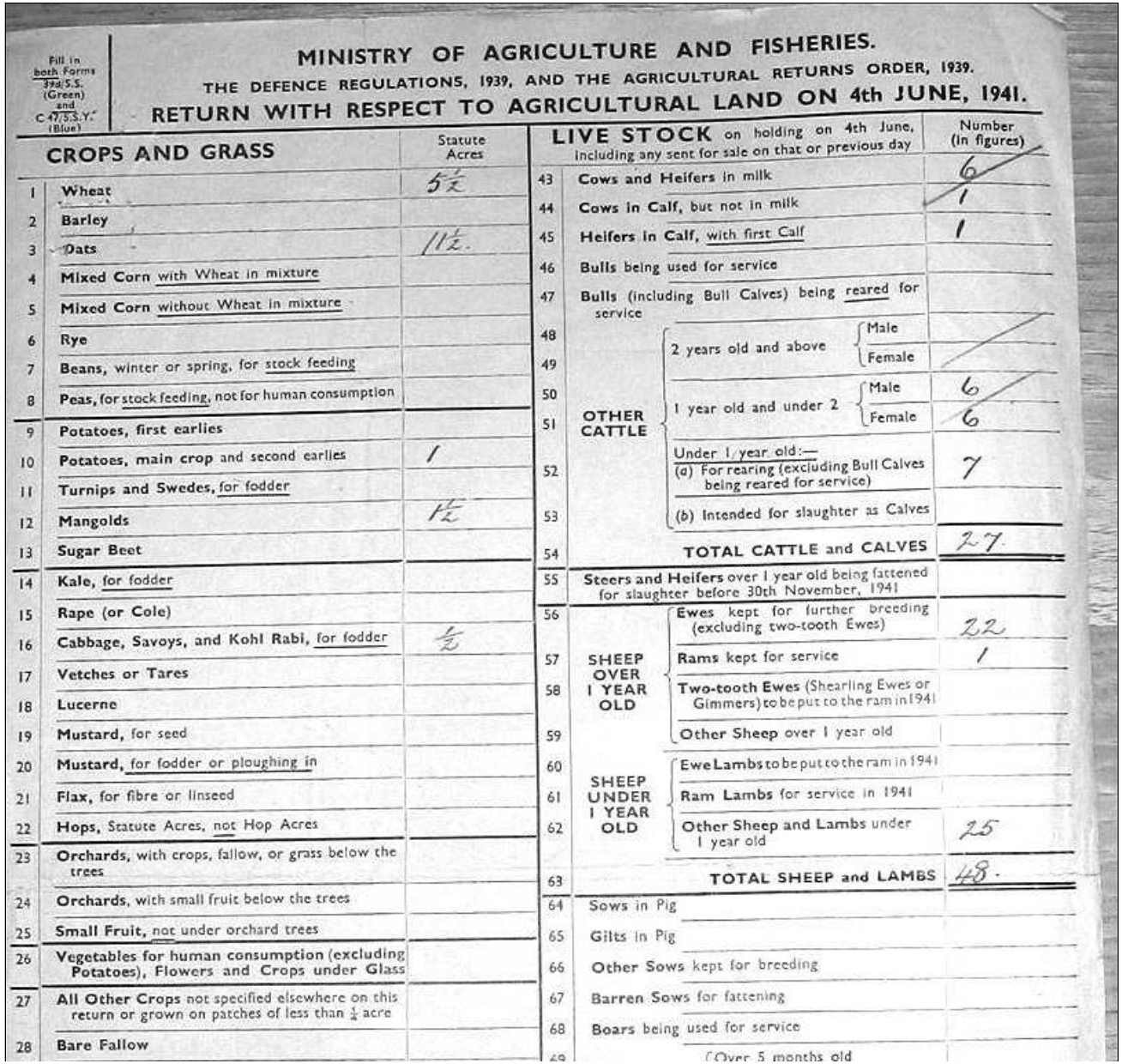
1. A touch screen gives you easy control during milking. You have real-time access to all the monitoring information you need such as cow ID, quarter flow rate, volume and cleaning status of the milking process. You can pilot the DeLaval online cell counter OCC during milking to view the SCC right from the touch screen.

2. DeLaval VMS features true quarter milking with four optical milk meters monitoring milk yields, flow rates, time, conductivity and blood levels.

3. The system´s integrated cleaning unit reduces cleaning time by 40 percent, which increases milking capacity. The entire cleaning process is controlled by the system and reported in the management software to give you optimal hygiene control.

4. The fast and gentle hydraulic multi-purpose robotic arm takes care of preparing the teats before milking (including optional pre-spray), attaches the teat cups, re-attaches if needed, aligns the milk tube and sprays the teats after milking.

Farming surveillance



Fill in both Forms 394/S.S. (Green) and C 47/S.S.Y. (Blue)

MINISTRY OF AGRICULTURE AND FISHERIES.

THE DEFENCE REGULATIONS, 1939, AND THE AGRICULTURAL RETURNS ORDER, 1939.

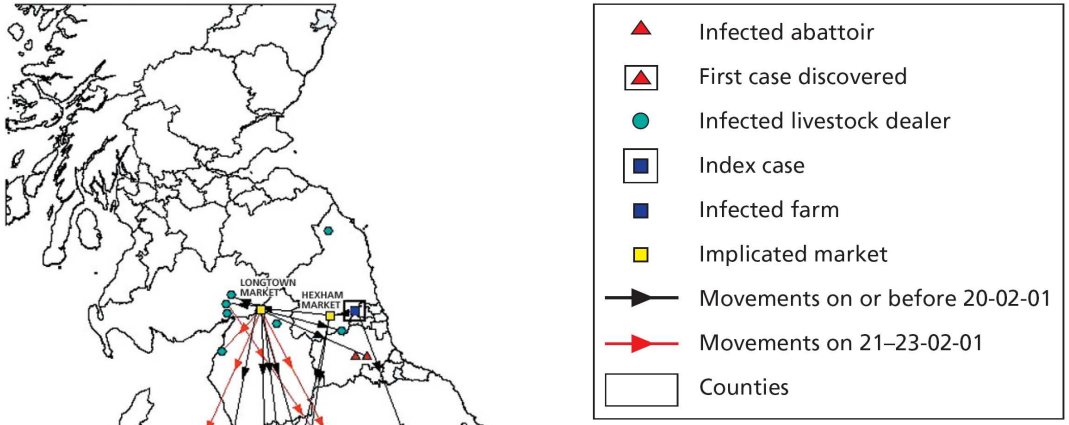
RETURN WITH RESPECT TO AGRICULTURAL LAND ON 4th JUNE, 1941.

	CROPS AND GRASS	Statute Acres
1	Wheat	5½
2	Barley	
3	Oats	11½
4	Mixed Corn with Wheat in mixture	
5	Mixed Corn without Wheat in mixture	
6	Rye	
7	Beans, winter or spring, for stock feeding	
8	Peas, for stock feeding, not for human consumption	
9	Potatoes, first earlies	
10	Potatoes, main crop and second earlies	1
11	Turnips and Swedes, for fodder	
12	Mangolds	1½
13	Sugar Beet	
14	Kale, for fodder	
15	Rape (or Cole)	
16	Cabbage, Savoys, and Kohl Rabi, for fodder	½
17	Vetches or Tares	
18	Lucerne	
19	Mustard, for seed	
20	Mustard, for fodder or ploughing in	
21	Flax, for fibre or linseed	
22	Hops, Statute Acres, not Hop Acres	
23	Orchards, with crops, fallow, or grass below the trees	
24	Orchards, with small fruit below the trees	
25	Small Fruit, not under orchard trees	
26	Vegetables for human consumption (excluding Potatoes), Flowers and Crops under Glass	
27	All Other Crops not specified elsewhere on this return or grown on patches of less than ¼ acre	
28	Bare Fallow	

	LIVE STOCK on holding on 4th June, including any sent for sale on that or previous day		Number (in figures)
43	Cows and Heifers in milk		6
44	Cows in Calf, but not in milk		1
45	Heifers in Calf, with first Calf		1
46	Bulls being used for service		
47	Bulls (including Bull Calves) being reared for service		
48	OTHER CATTLE — 2 years old and above	Male	
49		Female	
50	1 year old and under 2	Male	6
51		Female	6
52	Under 1 year old:— (a) For rearing (excluding Bull Calves being reared for service)		7
53	(b) Intended for slaughter as Calves		
54	TOTAL CATTLE and CALVES		27
55	Steers and Heifers over 1 year old being fattened for slaughter before 30th November, 1941		
56	SHEEP OVER 1 YEAR OLD — Ewes kept for further breeding (excluding two-tooth Ewes)		22
57	Rams kept for service		1
58	Two-tooth Ewes (Shearling Ewes or Gimmers) to be put to the ram in 1941		
59	Other Sheep over 1 year old		
60	SHEEP UNDER 1 YEAR OLD — Ewe Lambs to be put to the ram in 1941		
61	Ram Lambs for service in 1941		
62	Other Sheep and Lambs under 1 year old		25
63	TOTAL SHEEP and LAMBS		48
64	Sows in Pig		
65	Gilts in Pig		
66	Other Sows kept for breeding		
67	Barren Sows for fattening		
68	Boars being used for service		
69	Over 5 months old		

Veterinary surveillance

Figure 3.6. Movement of FMD-infected animals before 23 February 2001, and locations of implicated markets, abattoirs and dealers.



Crown Copyright DEFRA Licence No: GD27881

2 RESULTS

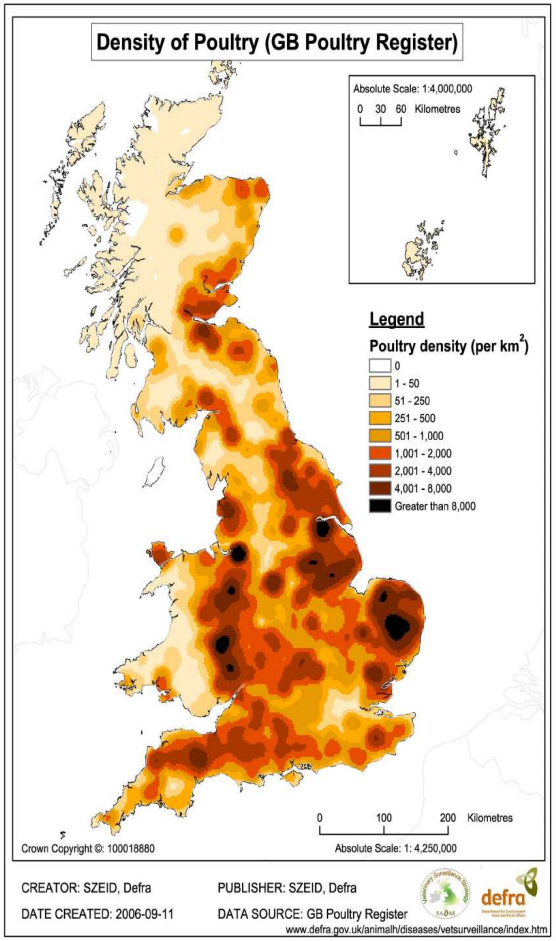
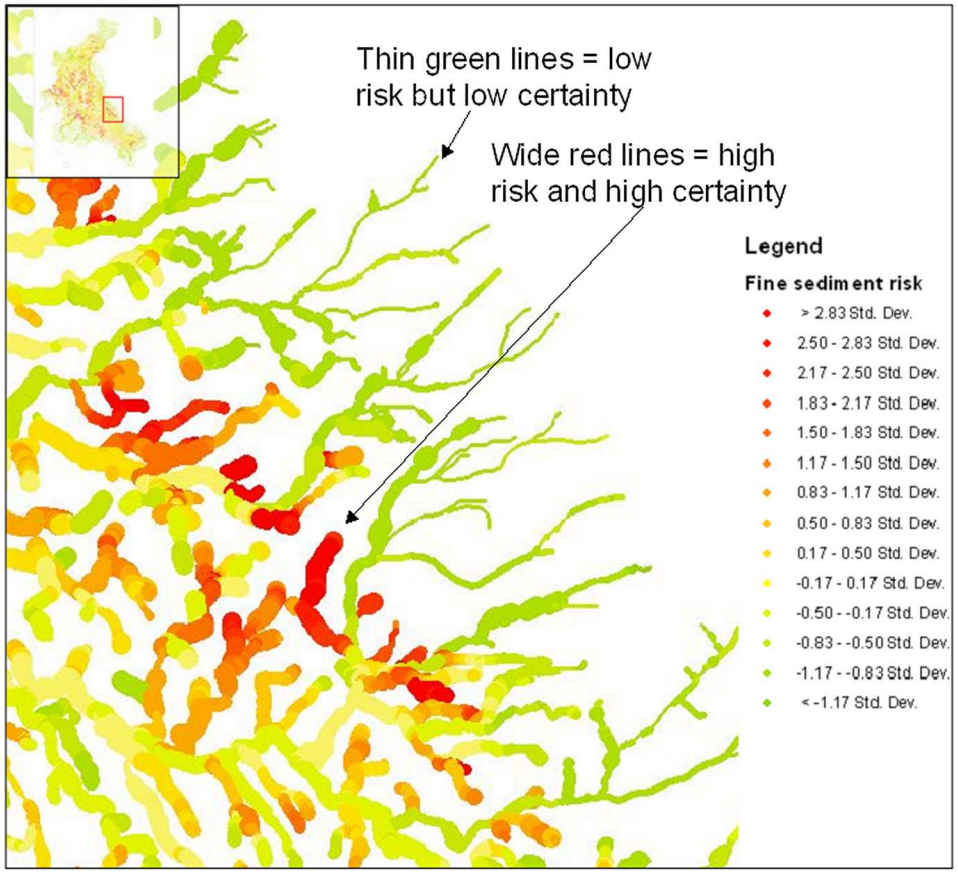


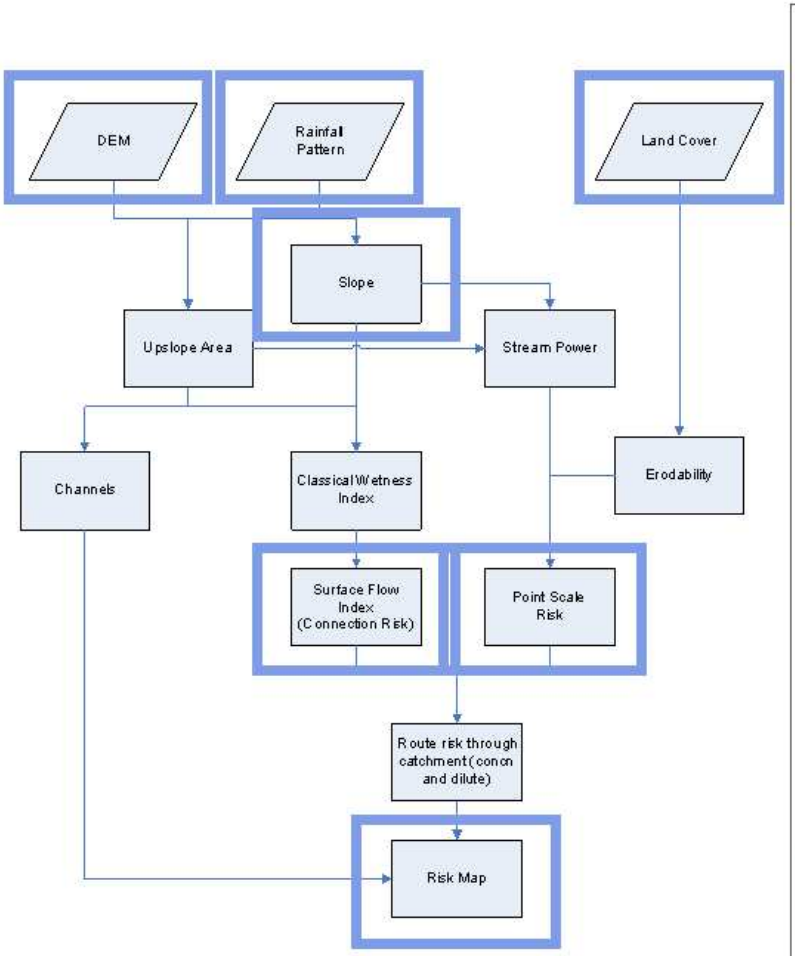
Figure 1. Density map of poultry population.

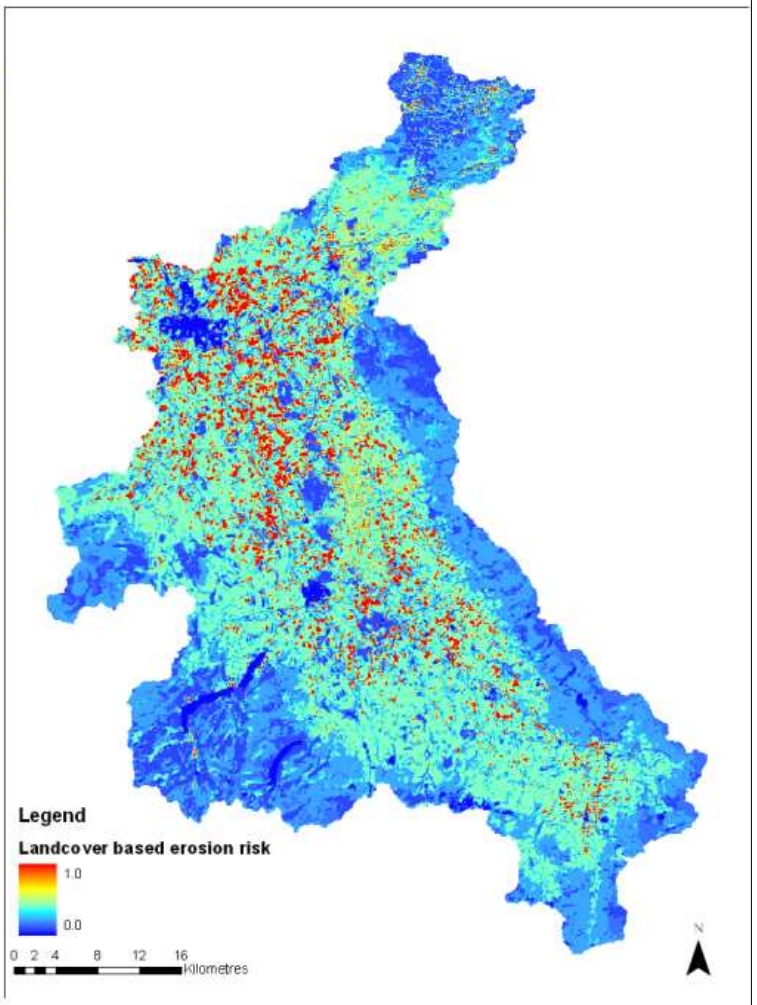
Simulating risks, predicting outputs



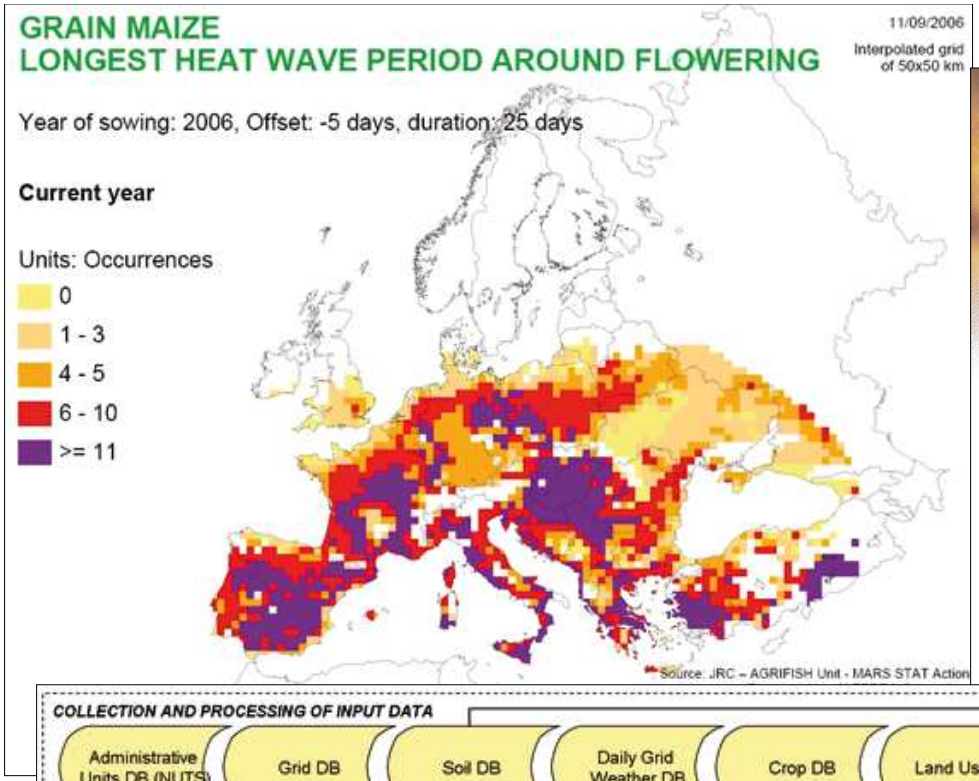
- Stuart Lane et al, (2006) 'Surveillant science'
- "The science is based on coupled mathematical modelling and remote sensing, applied at very high resolution (20 m) but very large spatial scales (>1000 km2), to identify where land management measures are required to protect the aquatic environment. Taking modelling and remote sensing together, this science makes statements about which locations in the landscape are likely to be the causes of diffuse pollution, without the need to visit those locations." (240)

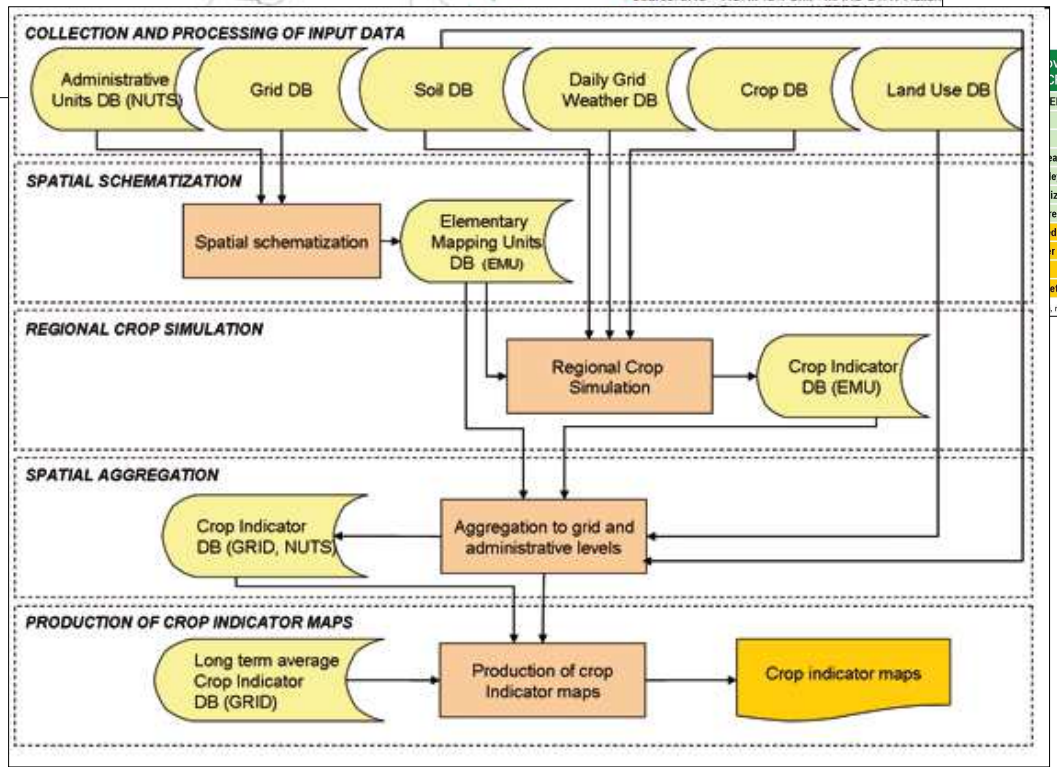
Calculation of a Fine Sediment Risk Map





- "These models are truly surveillant, as the data needed to drive them can be obtained without any knowledge of those to whom the data pertain." (253)





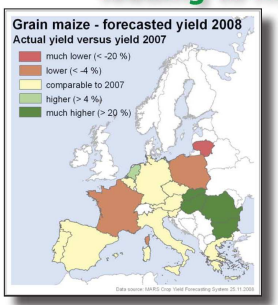
ISSN 1725-5813
EUR 23298 EN-2008

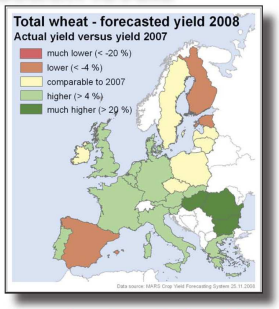
MARS AGROMETEOROLOGICAL Crop Monitoring in Europe

Review of the 2007-2008 campaign
Situation from1st September to 20th November

Vol. 16, No. 6

Favourable season coupled with increased area leading to high production levels





vember 2008 CROPS	EU27 yield forecast (t/ha) from AGRI4CAST				
	2007	2008	Avg 5 yrs	% 08/07	% 08/ Avg
EREALS	4.5	5.0	4.7	+11.1	+6.9
Soft wheat	5.1	5.7	5.4	+11.4	+5.4
Durum wheat	2.9	3.1	2.8	+8.8	+12.9
eat	4.8	5.4	5.0	+11.3	+7.0
ley	4.2	4.4	4.2	+4.8	+5.5
ize	5.8	6.9	6.3	+17.8	+8.4
reals (1)	3.2	3.5	3.2	+9.3	+6.7
d	2.8	3.0	3.0	+5.5	-1.6
r	1.5	1.6	1.6	+12.3	+0.2
	28.8	28.1	26.9	-2.4	+4.5
et	63.7	62.7	59.5	-1.5	+5.4

, rye, maslin, oats, triticale, mixed grain other than maslin, millet, buckwheat

A. Synthesis of the 2007-2008 campaign

1. Highlights of the 2007/08 campaign

Favourable conditions throughout the 2007/08 campaign, without exceptional events impacting strongly upon the yield, determined decidedly higher yield levels than last year and clearly above the five-year average for all cereals. The EU-27 final cereal yield figure is expected at 5.04 t/ha (about + 11 % compared with 2007 and + 6.9 % compared with the five-year average).

Conclusions

- Contemporary farming practice and governance – including such issues as food safety, animal welfare, environmental protection and efficient subsidy payments – are using software

- The emergence of this ‘countryside code’ is predicated on algorithmic data processing which transduces farming practices, land, crops and livestock in machine-readable objects

- But how far are some farm spaces now code/space? are coming to *depend* on software and distributed information systems to function?

- What is the effectiveness of real-time surveillance and potency of future predicting software simulations for managing rural landscapes?

References

- Budd L, Adey P, (2009) “The software-simulated airworld: anticipatory code and affective aero mobilities”, *Environment and Planning A*, forthcoming
- Fuller M, (2008) *Software Studies: A Lexicon* (MIT Press, Cambridge, MA)
- Graham S D N, (2005) “Software-sorted geographies”, *Progress in Human Geography* 29(5) 562-580
- Lane S N, Brookes C J, Heathwaite A L, Reaney S, (2006) “Surveillant science: challenges for the management of rural environments emerging from the new generation diffuse pollution models”, *Journal of Agricultural Economics* 57(2) 239-257
- Murdoch J, (1997) “Governmentality and territoriality: The statistical manufacture of Britain’s ‘national farm’”, *Political Geography* 16(4) 307-324
- Thrift N, French S, (2002) “The automatic production of space”, *Transactions of the Institute of British Geographers* NS 27 309-335
- Woods M, (2007) “Engaging the global countryside: globalization, hybridity and the reconstitution of rural place”, *Progress in Human Geography* 31(4) 485-507

Image Sources

- Slide 1: Illustration by Robin Hursthouse, scanned from The Guardian, Field Experts, Saturday July 21 2007, <http://www.guardian.co.uk/money/2007/jul/21/careers.work>
- Slide 2: Constable painting. Source: <http://en.wikipedia.org/wiki/Image:John_Constable_008.jpg>
- Slide 3: Pyre of culled animals from foot and mouth disease outbreak in 2001. Photography by Michel Spinger, AP/Wide World Photos. Source: <http://www.scienceclarified.com/dispute/Vol-1/Should-the-threat-of-foot-and-mouth-disease-be-met-by-the-destruction-of-all-animals-that-might-have-been-exposed-to-the-virus.html>
- Slide 4: BBC News website. Source: <http://news.bbc.co.uk/1/hi/uk/7093806.stm>
- Slide 7: The Farm, Ladybird book cover scan. Source: <http://flickr.com/photos/37997987@N00/515875302>
- Slide 8: Cattle ear tag. Source: <http://www.defra.gov.uk/animalh/id-move/cattle/memberstates.htm#2>; Cattle passport sample. Source: <http://www.defra.gov.uk/animalh/id-move/cattle/memberstates.htm>
- Slide 9: Egg traceability System web page. Source: <http://www.lioneggfarms.co.uk/information/egg-codes/>
- Slide 10: DeLaval marketing brochure. Source: <http://www.delaval.com/NR/rdonlyres/E8455914-F039-49F0-A56D-98720E04897E/0/vms_basic_brochure_web.pdf>
- Slide 11: De Laval marketing brochure. Source: <http://www.delaval.com/NR/rdonlyres/E8455914-F039-49F0-A56D-98720E04897E/0/vms_basic_brochure_web.pdf>

Image Sources

- Slide 12: Enumeration form from 1941 Nation Farm Survey. Source: <http://countryside-quality-counts.org.uk/publications/1941-Farm-Survey.pdf>
- Slide 13: FMD movement map. Source: <http://royalsociety.org/inquiry/index/idl_3to4.pdf>; Density of poultry map. Source: <http://www.defra.gov.uk/animalh/diseases/vetsurveillance/reports/pdf/poultry-registered080211.pdf>
- Slide 14: Uncertainty on risk map. Source: <http://www.dur.ac.uk/sim.reaney/scimap/reaney_bhs_2006.ppt>
- Slide 15: Flow diagram and risk map. Source: <http://www.dur.ac.uk/sim.reaney/scimap/reaney_bhs_2006.ppt>
- Slide 16: Grain maize map and flow diagram. Source: <http://www.geoinformatics.com/asp/default.asp?t=article&newsid=3175>; MARS Bulletin screenshot. Source: <http://mars.jrc.ec.europa.eu/mars/Bulletins-Publications>