NORDSJÆLLANDSKE BIVENNER

www.nbv-biavl.dk

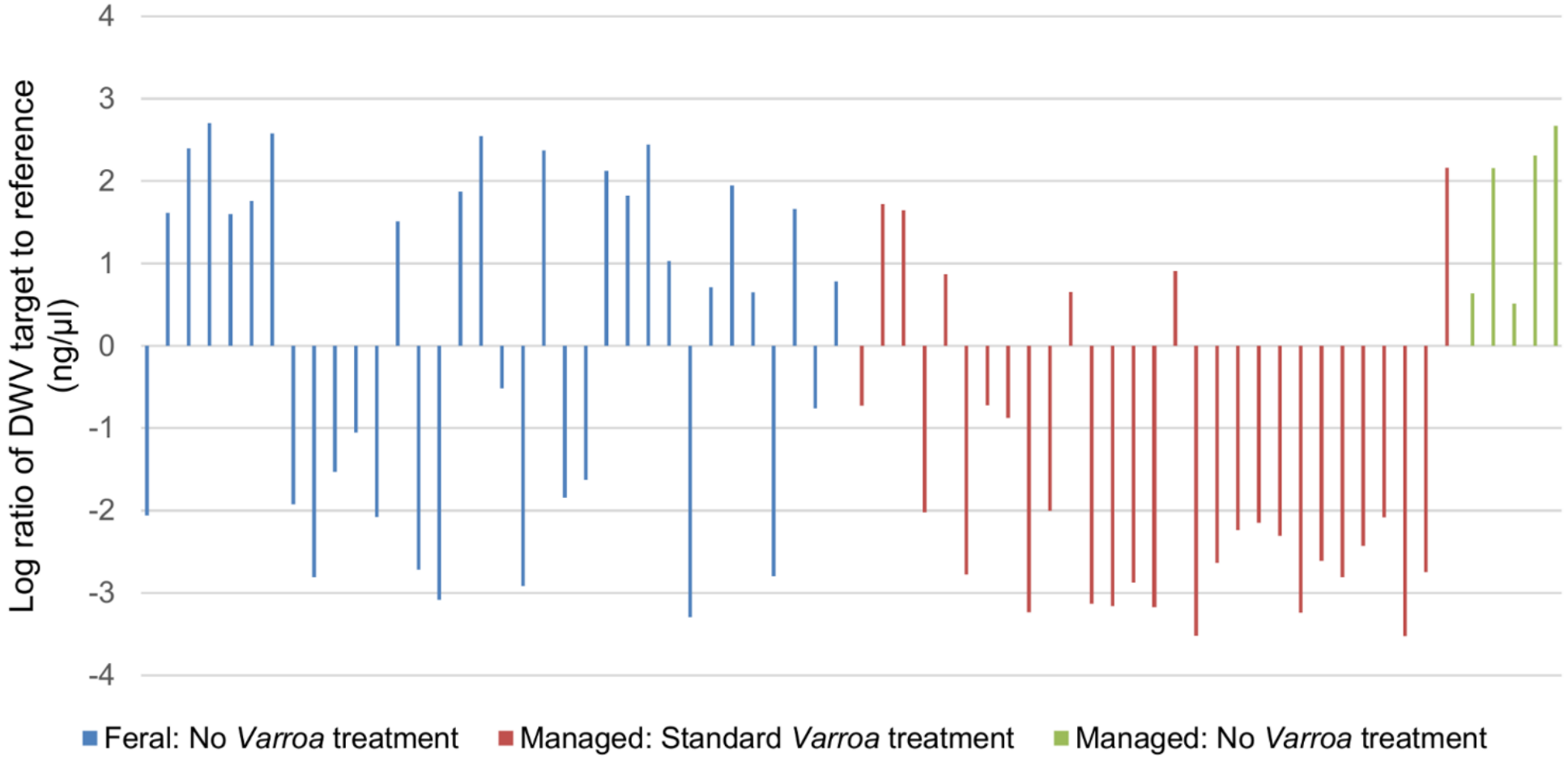
Varroa Monitorering

Hvad er problemet ?

- Varroa er nok den største/værste fare for bierne
  ~ Varroasyge
  - Men det er ikke Varroa miderne, der direkte dræber bierne
  - Stor sammenhæng mellem forekomsten af Varroa og Virus
  - Varroa virker som Vektor (smittebærer) for:
    - Deform Vinge Virus (DWV), Sækyngel (SBV), Kashmir Bi Virus (KBV), Israelsk Akut Paralyse Virus (IAPV)
  - Men også som Aktivator (forårsager udbrud) af en række Virus infektioner.

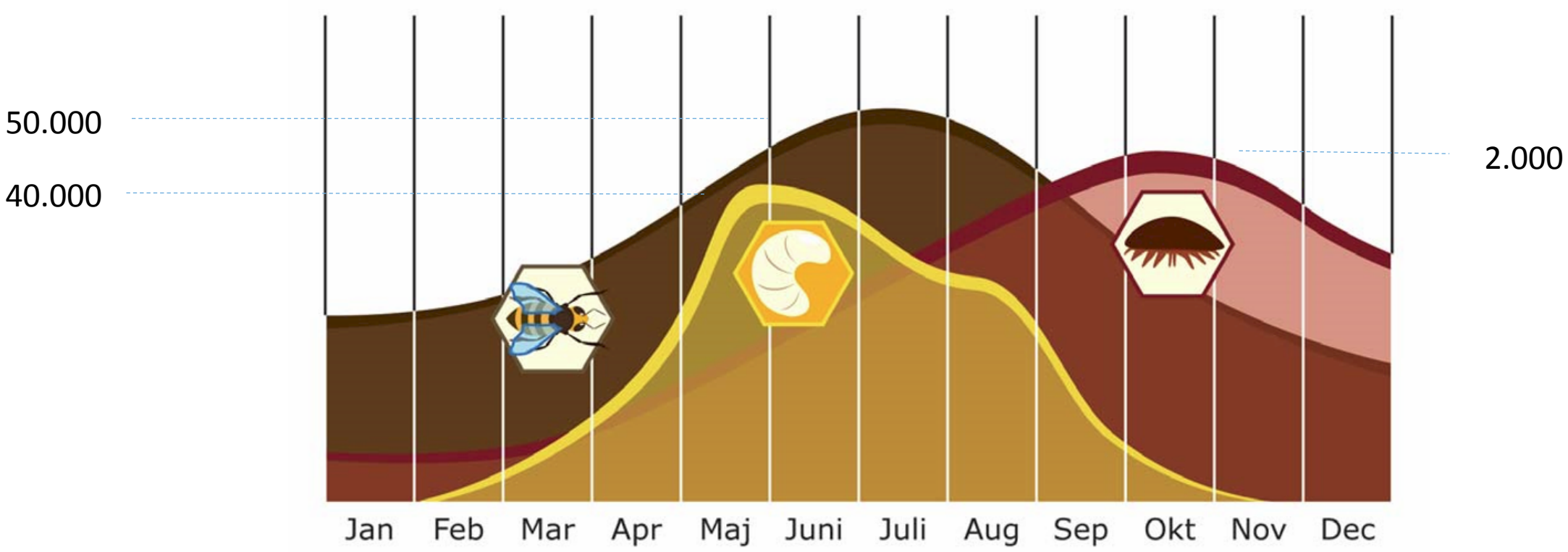
Parasite Pressures on Feral Honey Bees …,

Thompson et al., 2014

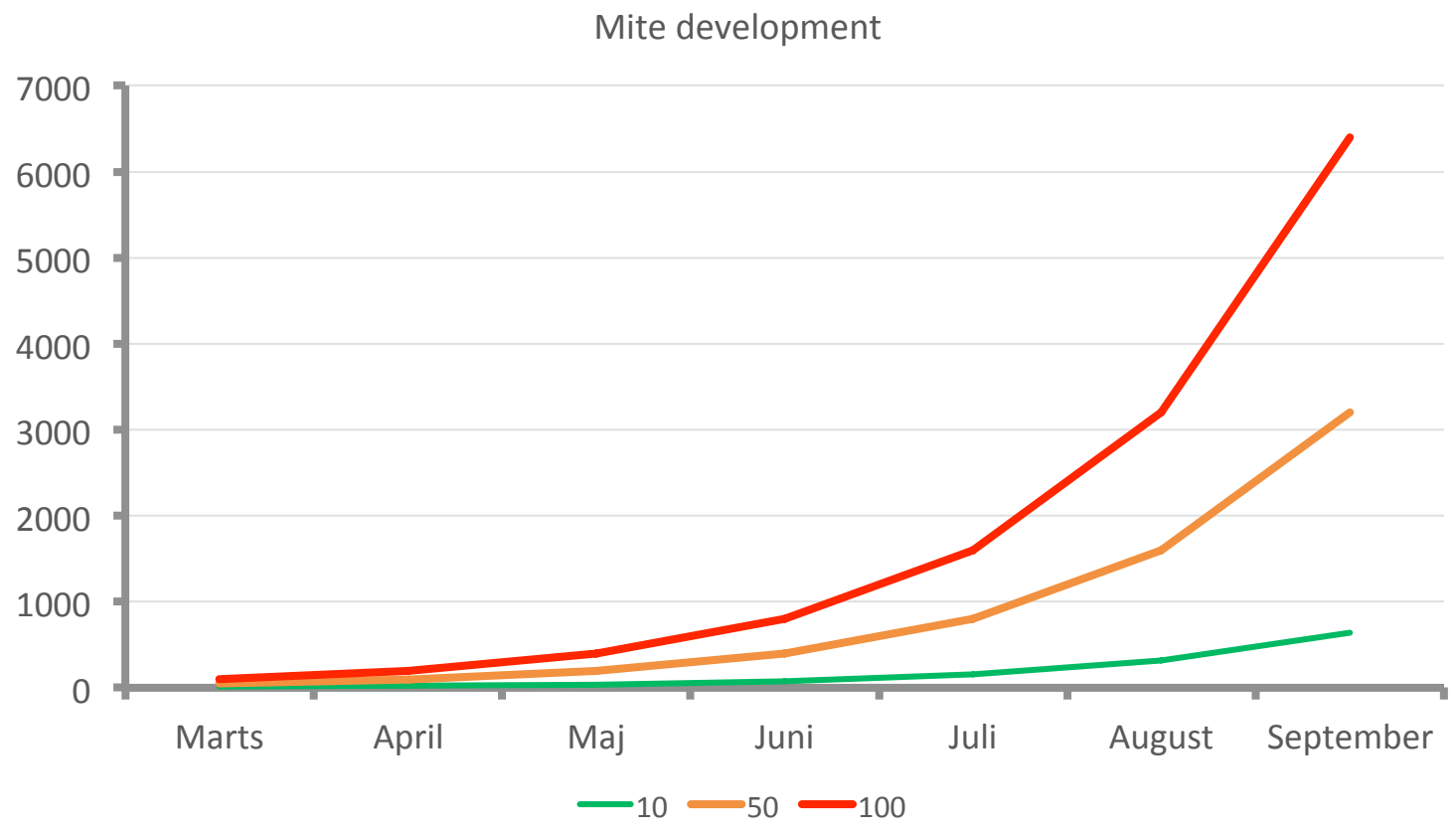


Hvor mange Varroamider i bifamilien?

- Totale antal mider i familien? 1.000, 2.000, 5.000, 10.000 ?
  - I yngelperioden fordobles antallet af mider hver måned!
- Men hvor stor er familien? 10.000, 20.000, 50.000 ?



Teoretisk udvikling af miderne



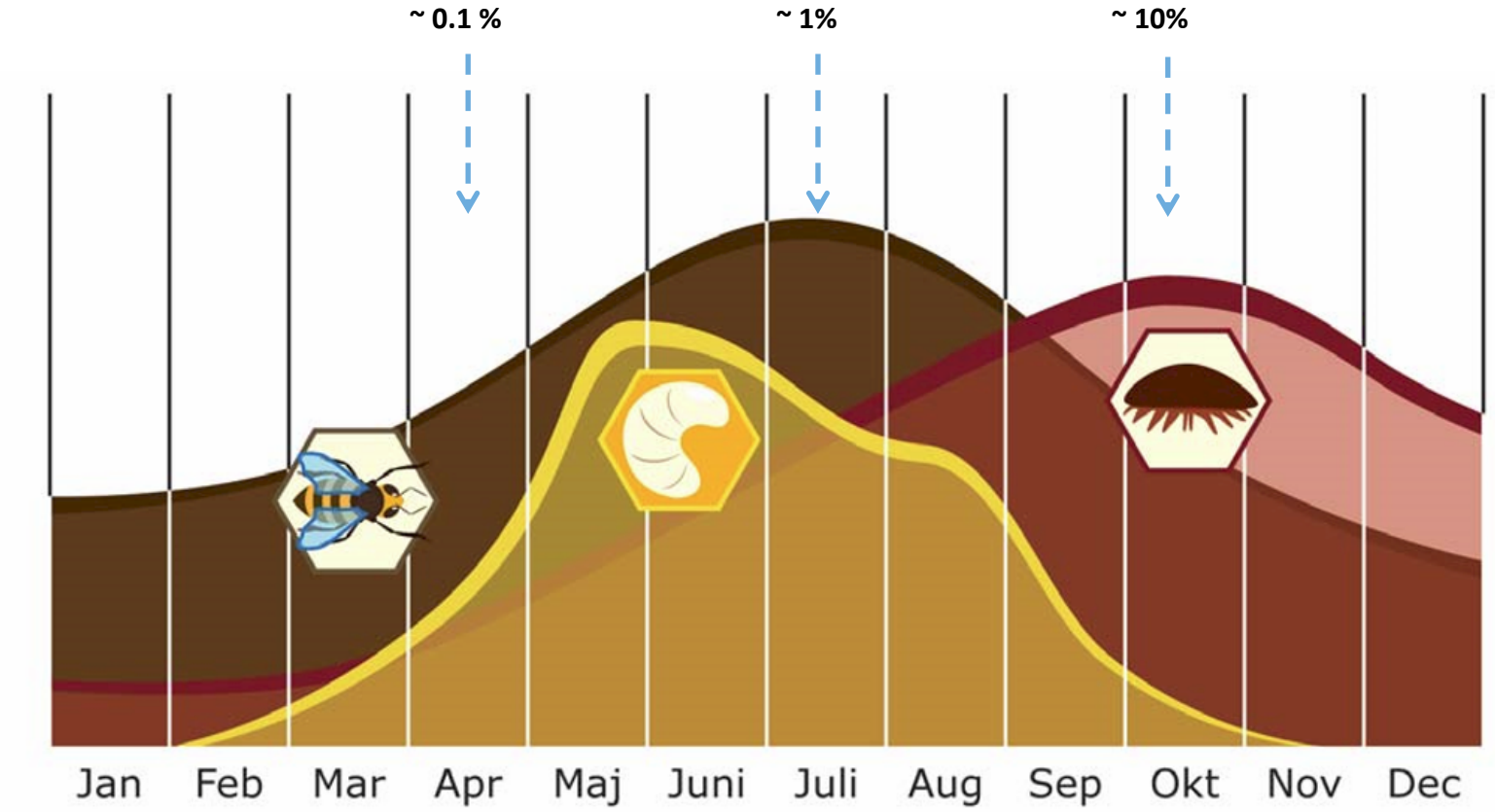
Hvor mange Varroamider i bifamilien?

- **Angrebsgrad**, index (%)
  - Antal mider per 100 bier
  - Afhænger af årstiden, yngelmængden, …

20*100/20.000
= 0.1%

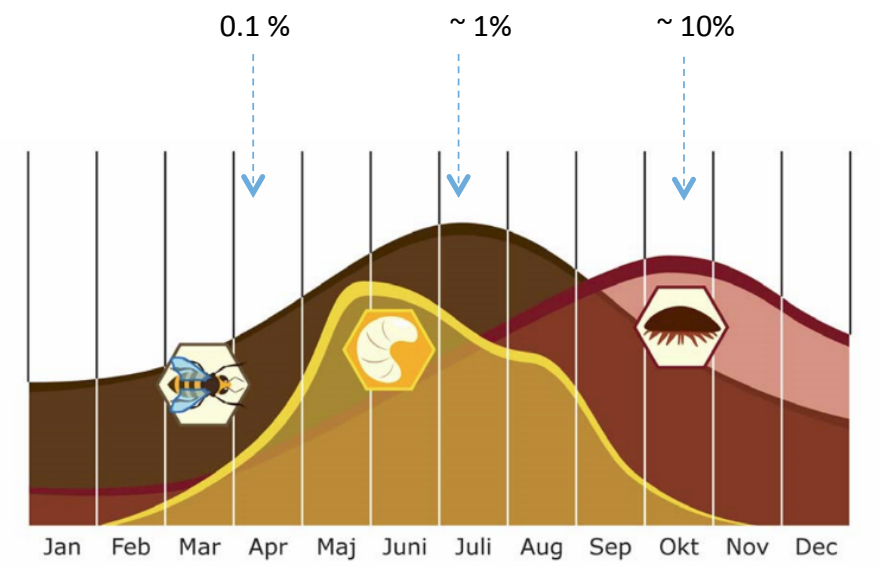
500*100/50.000
= 1 %

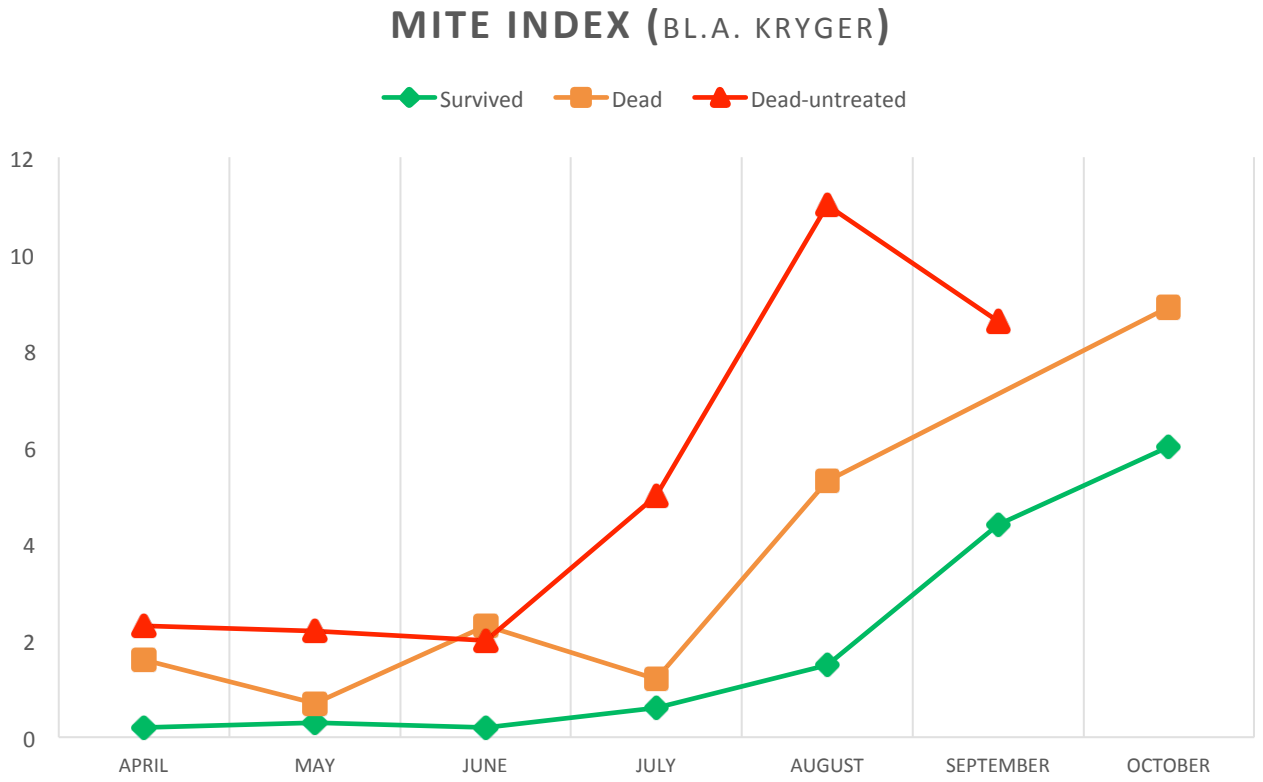
2000*100/20000
= 10 %



Angrebsgraden. Hvad tåler bifamilien?

- Angrebsgrad, index (%)





Hvordan bestemmes Angrebsgraden ?

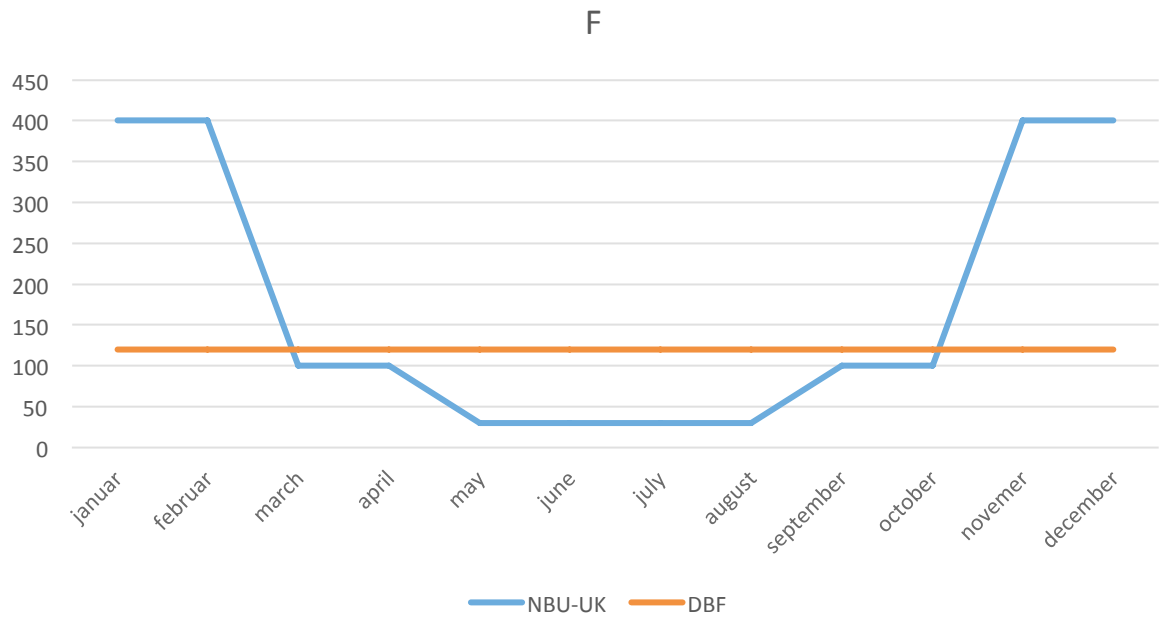
- Vi kan bruge Direkte eller Indirekte metoder
- Direkte Metoder
  - Hele stadet dræbes og bier, yngel og Varroa mider tælles – Forskning!
  - **Sulfo metoden**
  - **Flormelis metoden**
  - CO2 metoden, ret usikker
- Indirekte Metoder
  - Se på bierne. Er der f.eks. tegn på DWV? – For sent !
  - **Naturligt mide nedfald**
  - Tælling af mider i droneyngel (indeholder måske 10% af miderne) – Usikker og kun i yngelsæsonen !

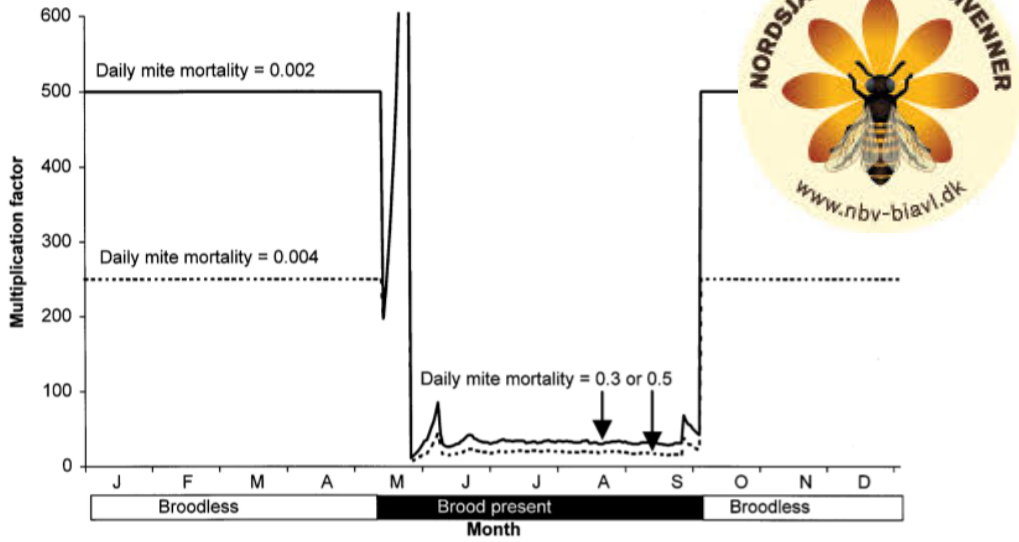
“Direkte” Metoder

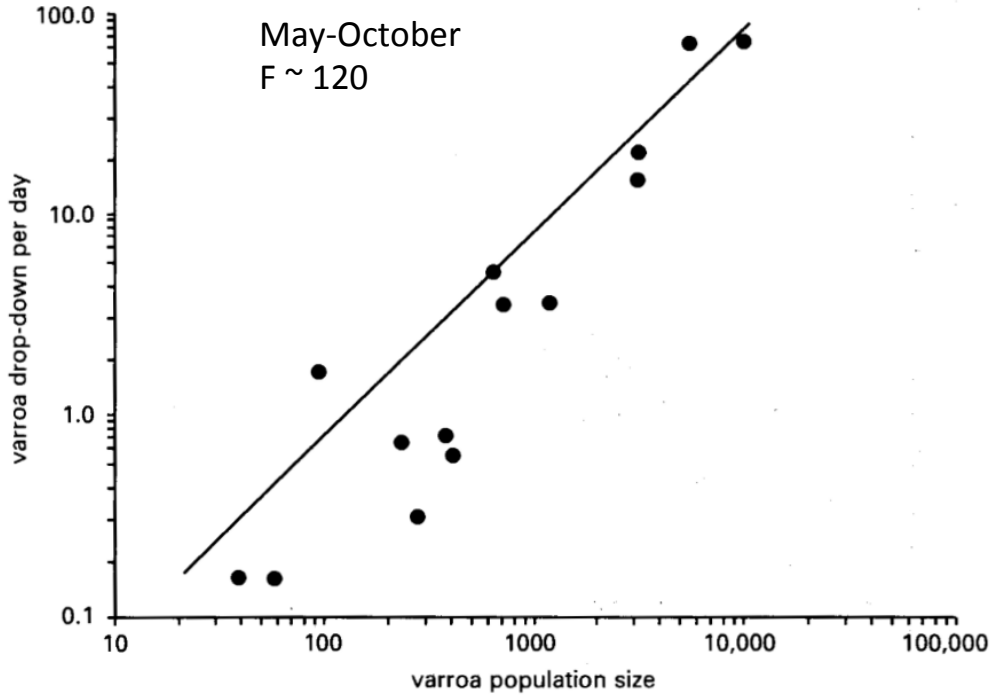
- Udtag prøve på 100 ml ≈ 300 bier fra en tavle yderst i yngellejet
  - Brug f.eks. et stykke plastic
  - **Undgå at få dronningen med!**
- Sulfo metoden (Bierne går til)
  - Kom ca. 2 dl vand med sulfo i et honningglas og tilsæt bierne og ryst i ca. 30 sek.
  - Hæld bierne ud på en dobbelt-si (grov ovenpå fin) og skyld grundigt med vand
  - Tæl miderne i fin-sien, n.
- Flormelis metoden (Bierne hældes tilbage til stadet foran flyvespalten)
  - Kom bierne i et honningglas og tilsæt 2 spiseskefulde helt tør flormelis
  - Rystes og rulles i ca. 30 sek. og står i ca. 3 min mens der rystes let ind imellem
  - Påsæt netlåg (3x3 mm) og ryst mider og flormelis ud på et hvidt stykke papir eller en hvid balje med vand
  - Tæl miderne, n.
- Beregn angrebsgraden, dvs. n/3 % (af frie mider !)

Naturligt Midenedfald

- Nedfaldet afhænger af dødeligheden
  - Nedfald $\propto$ det totale antal mider
  - Totale antal = F * Dagligt nedfald
  - Afhænger af yngelmængden, …





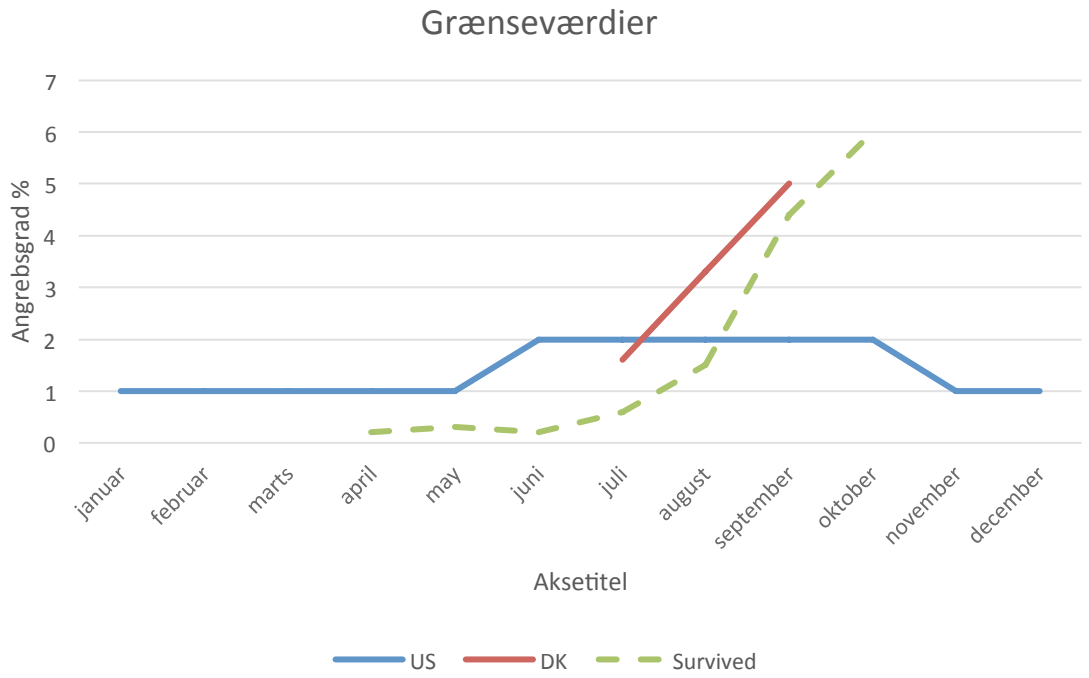


Indirekte Metode – Naturligt nedfald

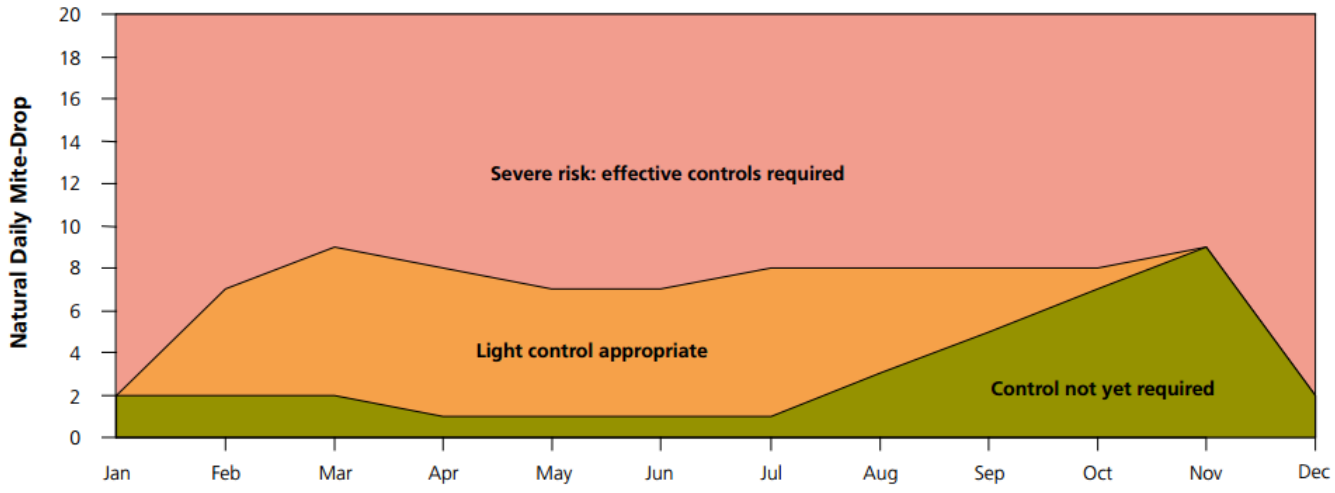
- Smør indskudsbakken med lidt madolie
  - Lad den sidde 1 uge
  - Tæl miderne i nedfaldet, n
  - Beregn det daglige nedfald, dvs. n/7

Skadestærskler

- Angrebsgrad



- Dagligt nedfald

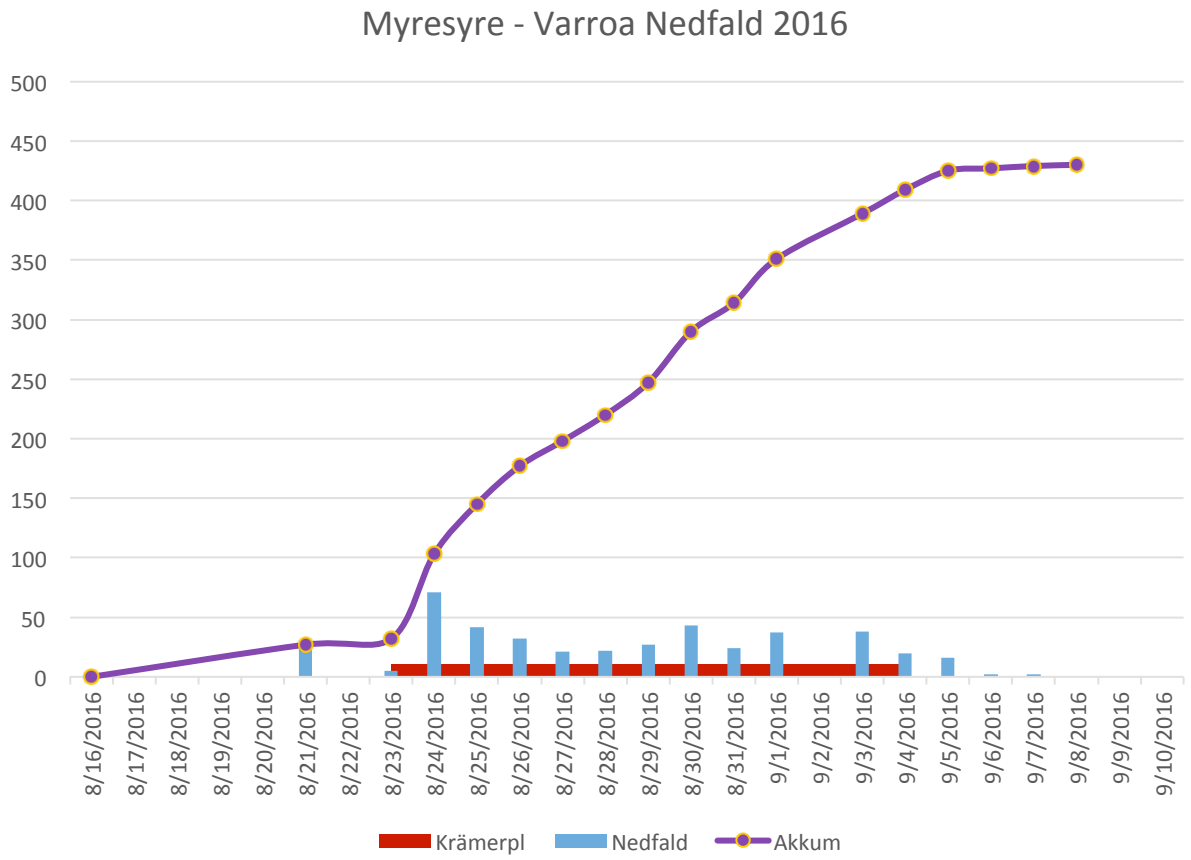


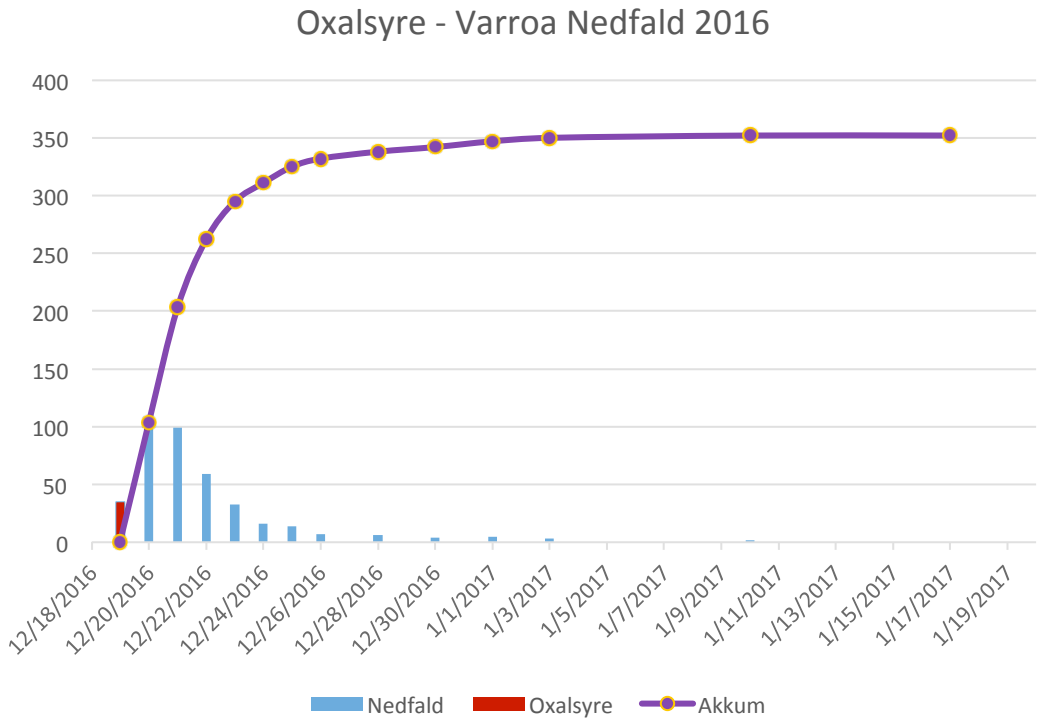
Eksperimenter

1. Sammenlign sulfo og flormelis metoderne
   - Udtag 2 x 100 ml bier og foretag tællingerne med hhv. sulfo og flormelis
   - Vurder bistyrken - antal fyldte tavlegader
   - Gentag f.eks. hver måned
2. Sammenlign sulfo og nedfalds metoderne
   - Udtag 100 ml bier og foretag tællingen
   - Vurder bistyrken - antal fyldte tavlegader
   - Lad indskudsbakken sidde 1 uge og tæl nedfaldet
   - Gentag f.eks. hver måned

Eksperimenter

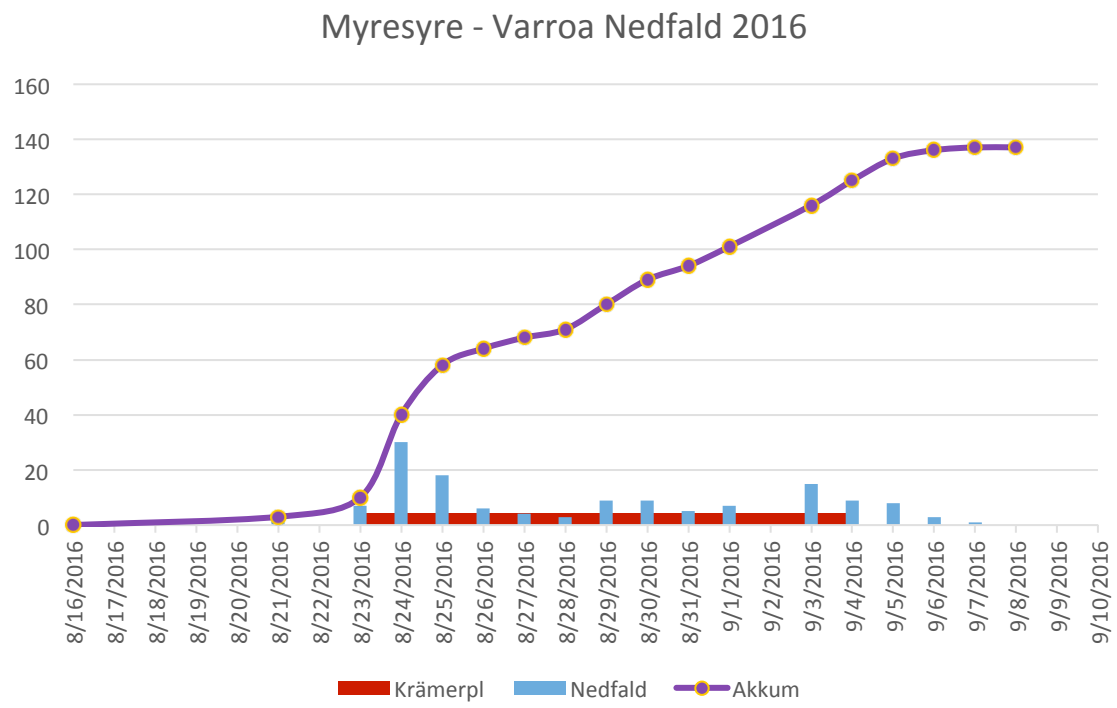
3. Tæl midenedfaldet når der behandles

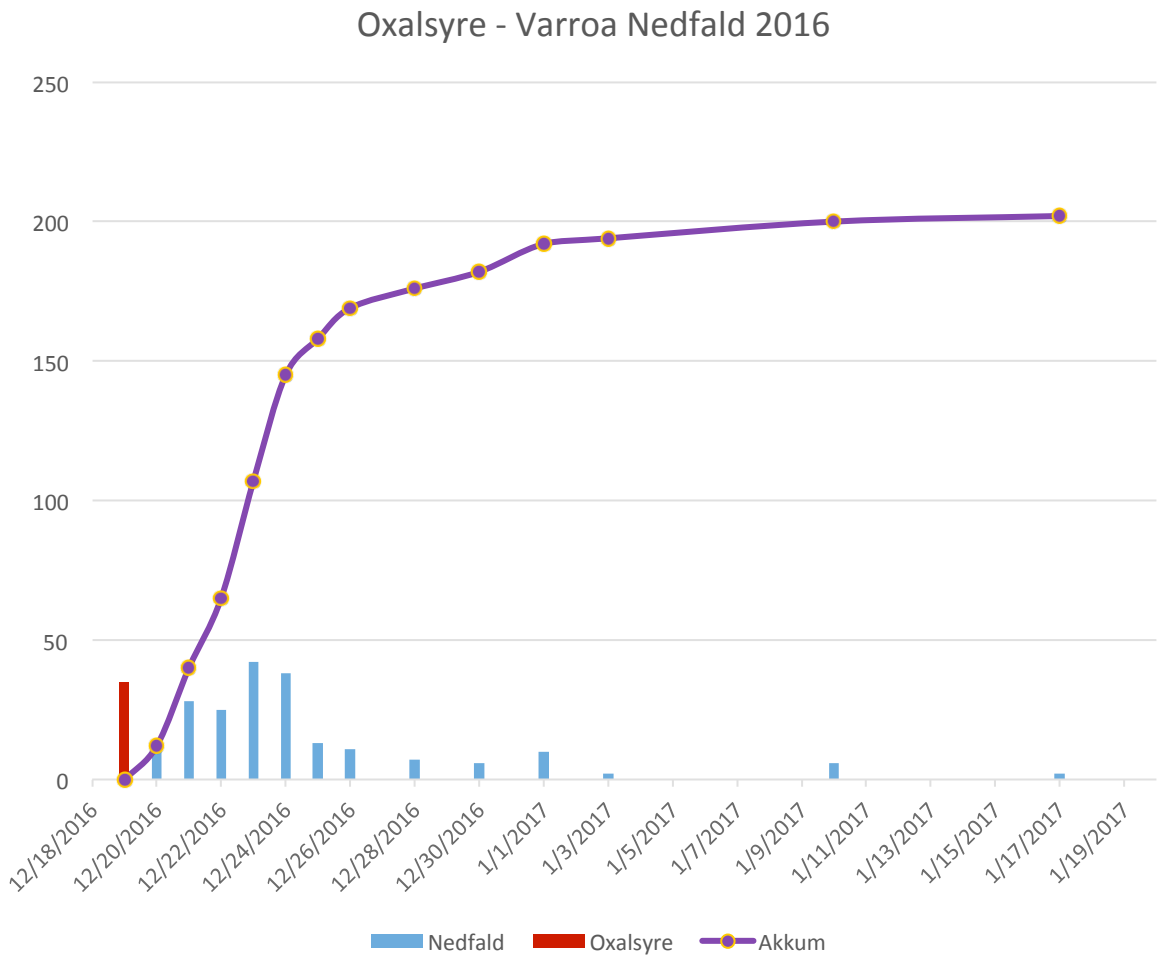




Eksperimenter

Opfrodring: Deltag i DBF's Midetællergruppe

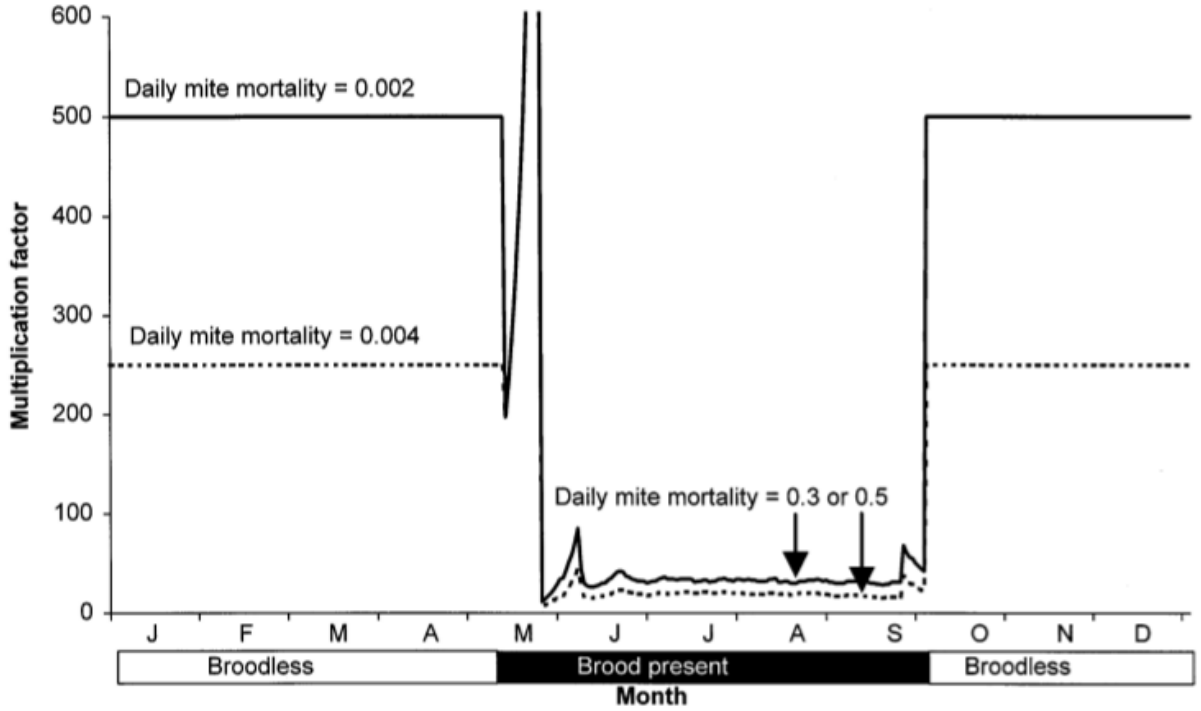




Slut

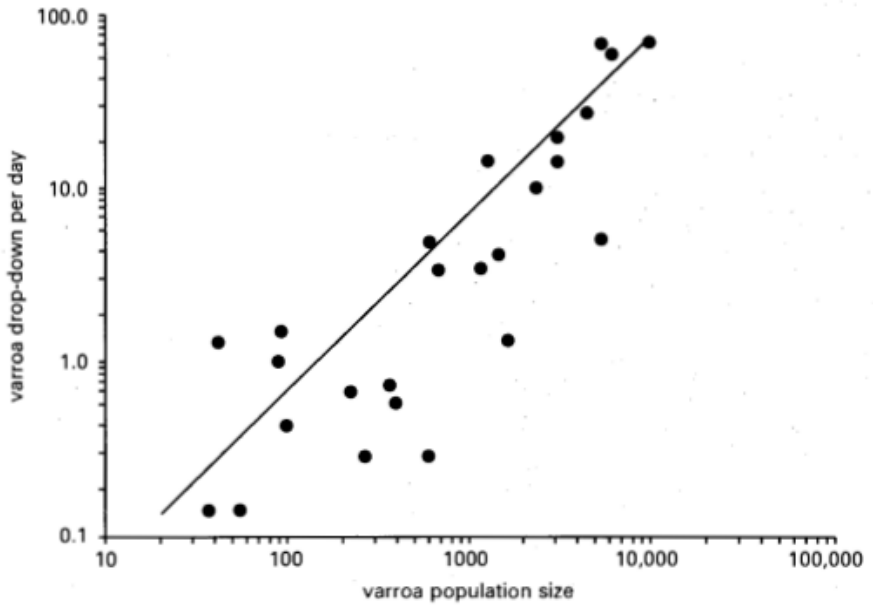
A population model for the …, Martins, 1998

- the model predicts that :65% of the mite population (55% in worker and 10% in drone) are in the sealed brood at any time



Monitoring Method as a Basis …, Brødsgaard, Brødsgaard, 1998

Figure 1: The relationship between varroa mite population size and calculated daily natural mite mortality during a 1-week sampling period



The straight line indicates best fit of a linear regression on non-transformed data ($r^2 = 0.77$, $p < 0.0001$).

Population modelling of Varroa jacobsoni, Calis, Fries et al, 1999

- The rate at which mites fall from bees is taken to be 0.6 %/day.
- The winter mortality rate is assumed to be 0.4 % (Fries et al.,1994)
- We used as numbers of drone brood cells 4 % of the number of worker brood cell
- population doubling time of 30 days.
- The death rate during the phoretic phase, d, is 0.006 per day as in our model.
- Daily mortality is, for almost the entire brood-rearing period, between 1 and 2 % of the mite population.

http://www.staff.uni-marburg.de/~ag-biene/files/varroa_unter_kontrolle.pdf

- Nedfald
  - Juli: > 5 – 10 pr. Dag => omgående behandling
  - Oktober/November: > .5 pr. Dag => vinterbehandlig nødvendig

- Index
  - Juli: > 1% => behandling senest næste uge
  - Oktober/November: > 2% => vinterbehandlig nødvendig

National Bee Unit, http://www.nationalbeeunit.com/index.cfm?pageid=93

Natural Mite Mortality

- The system is accurate in the winter and summer but during March, April, September and October the results are less accurate. No treatment or control should be carried out during the sampling period
  - Use Sticky board to estimate daily mite fall
  - During summer collect debris for at least 7 days;
    During winter collect debris for a longer period;
  - Multiply the daily mite fall figure by one of the following.
    - Winter i.e. November to February x400
    - Summer i.e. May to August x30
    - March, April, September and October x100
      (These periods are approximate only)
- NB It is easier to look at hive debris daily and count the mites, which are usually clearly visible. Make a note of the number and clean the insert off before replacing it under the floor.

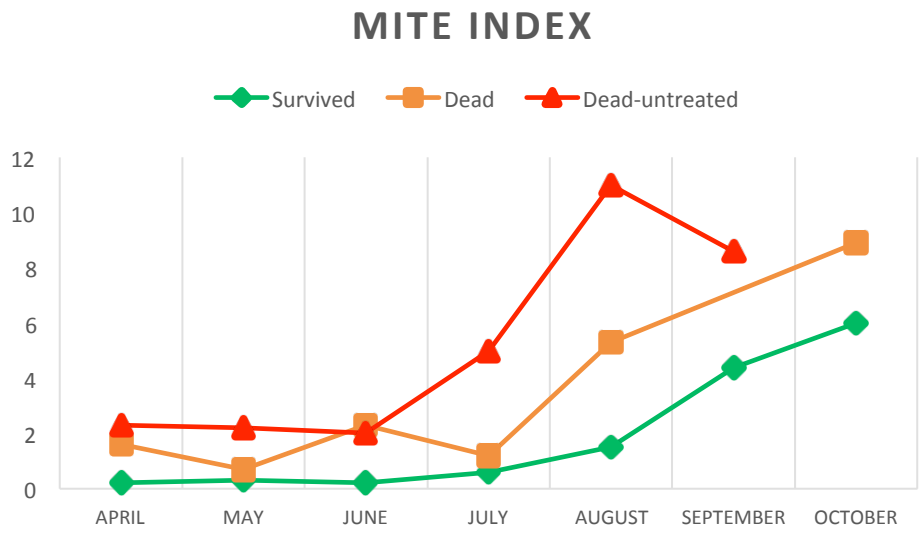
Varroa-Virus Interaction in Collapsing Honey Bee Colonies

Francis, Nielsen, Kryger, PLOS 2013

Varroa mite index (mites per 100 bees) from surviving and dead colonies.

Month	Surviving (Treated)	Dead (Treated)	Dead (Untreated)	Signif¤
APR	0.2	1.6	2.3	**
MAY	0.3	0.7	2.2	*
JUN	0.2	2.3	2.0	*
JUL	0.6	1.2	5.0	ns
AUG	1.5	5.3	11.0	ns
SEP	4.4	29.2	8.6	ns
OCT	6.0	8.9	25.0#	ns
n	16	4	3#	

All surviving colonies (n = 16) were treated. Four colonies that died over the winter were treated. All untreated colonies died over winter.
#n = 2 in October. Despite the treatment, mite infestation level increased, especially in the succumbing colonies. This could be due to ineffective treatment or subsequent mite reinvasion.
¤Significant difference in mite index between surviving and dead colonies (* $P<0.05$, ** $P<0.01$, *** $P<0.001$).
doi:10.1371/journal.pone.0057540.t001



TOOLS FOR VARROA MANAGEMENT, The Honey Bee Health Coalition, 2015

Interpreting Sample Findings

When using the recommended powdered sugar shake or alcohol or soap wash sampling methods we suggest ***using the following guidelines (Figure 2) to determine when a colony needs treatment and to evaluate treatment.***

Figure 2: Treatment Thresholds by Phase;(%=Number of mites/100 adult bees)

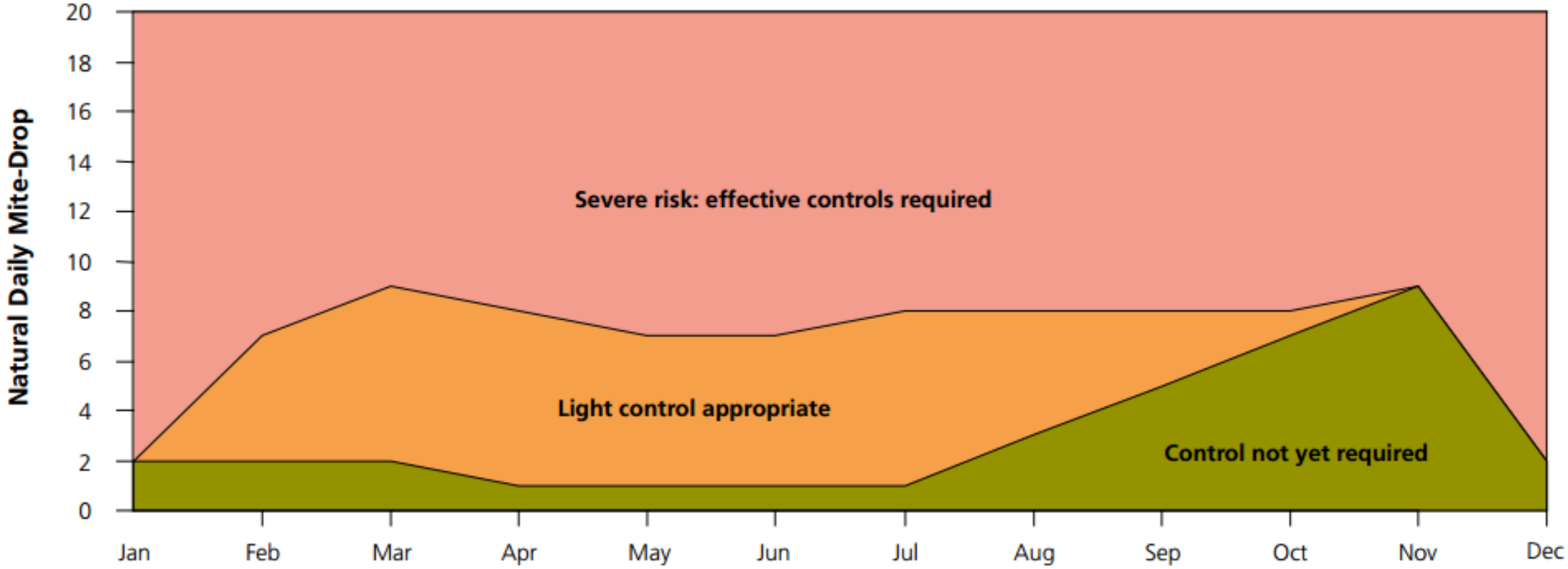
Colony Phase	Acceptable Further control not needed	Caution Control may be warranted	Danger Control promptly
Dormant with brood	<1%	1-2%	>2%
Dormant without brood	<1%	<2-3%	>3%
Population Increase	<1%	<2-3%	>3%
Peak Population	<2%	<3-5%	>5%
Population Decrease	<2%	<2-3%	>3%

Acceptable: *Current mite populations are not an immediate threat.*

Caution: *Mite population is reaching levels that may soon cause damage; non-chemical control might be employed while chemical control may be needed within a month; continue to sample and be prepared to intervene.*

Danger: *Colony loss is likely unless the beekeeper controls* Varroa immediately.

Animal & Plant Health Agency, www.nationalbeeunit.com/downloadDocument.cfm?id=16



National Bee Unit, http://www.nationalbeeunit.com/index.cfm?pageid=93

Drone Brood Uncapping

- Select an area of sealed drone brood at an advanced stage, i.e. purple eyed stage;
- Insert a honey uncapping fork under the cappings and lift out the pupae. You may find that twisting the fork will ease the removal of the cappings;
- Mites present will be clearly visible on the pupae. Count the number of pupae with mites on (a), and the number of pupae sampled (b).
- Calculate the number of sealed drone cells present in the colony.
- Divide the number of infested drone pupae by the number of drone pupae sampled. That is (a) divided by (b).
- Multiply the result by the number of sealed drone cells in the colony and multiply that figure by x10 to give the mite population.
- N.B. This method becomes more accurate with a large sample, which should be in the region of 100 pupae.