Prospects for rodent fertility control

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Wildlife Fertility Control

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10TH INTERNATIONAL CONFERENCE ON
WILDLIFE FERTILITY CONTROL
Bridging The Gap: From Science to Management
April 23-24,2026 Barcelona, Spain

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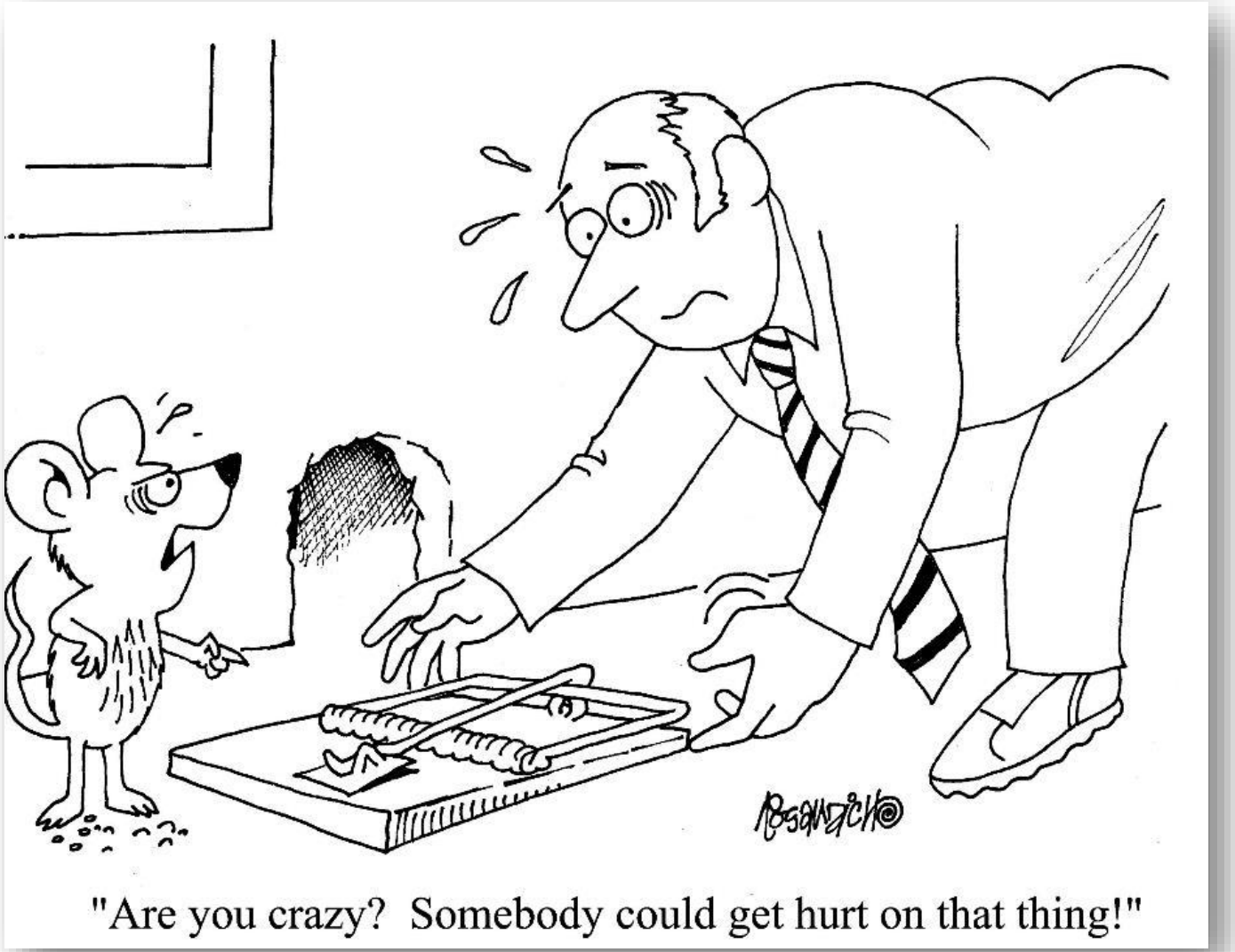
FERTILITY CONTROL FOR RODENTS

Prospects to increase use of fertility control for rodents are growing as regulators continue to restrict the use of poisons.

Current tools and technology for rodent management are increasingly restricted with growing public priorities on animal welfare and environmental safety

- Serious offences of animal cruelty can get you 5 years in prison in the UK
- Anticoagulants are increasingly restricted for environmental reasons
- Anticoagulant rodenticides are not available for plant protection in Europe, and restricted on livestock farms
- Glue traps are banned in several countries
- Use of other traps may be more regulated and restricted in the future



Fertility control instead of mortality control

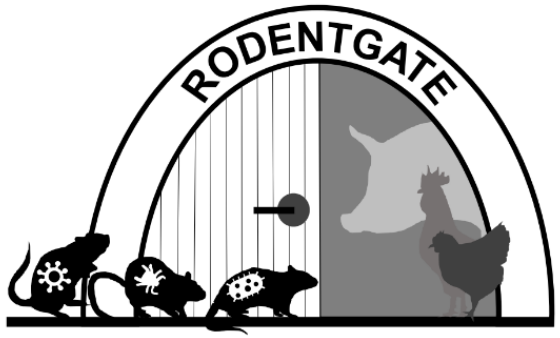
Stenseth et al (2001) Comparing strategies for controlling pest rodents. *Journal of Applied Ecology.* 38(5): 1020-1031

Fertility control has been argued to be more effective than mortality control

- Particularly useful for r-selected populations
- Dampening population outbreaks
- Ethically better than mortality control, but does fertility control work in practice?
- Several research groups investigating different mechanisms, with some commercialised products available in the USA (but no where else)
  - Immuno-contraception
  - Plant derived estrogenics
  - Chemo-sterilants
  - Hormones

Fertility control should be more effective in dampening outbreaks

Growing evidence through One Health research suggests killing rodents may exacerbate zoonotic disease transmission



- Disease interactions between rodents and livestock
- European pig and poultry farms
- Collaborating with Belgium, Netherlands, Germany, Poland and UK

- Disease interactions between rodents and humans
- UK with Tanzania and Madagascar rural communities

RodTickPathMan

- Disease interactions between invasive grey squirrels, ticks and Lyme disease
- One Health vector borne disease programme in UK

OHRatSA

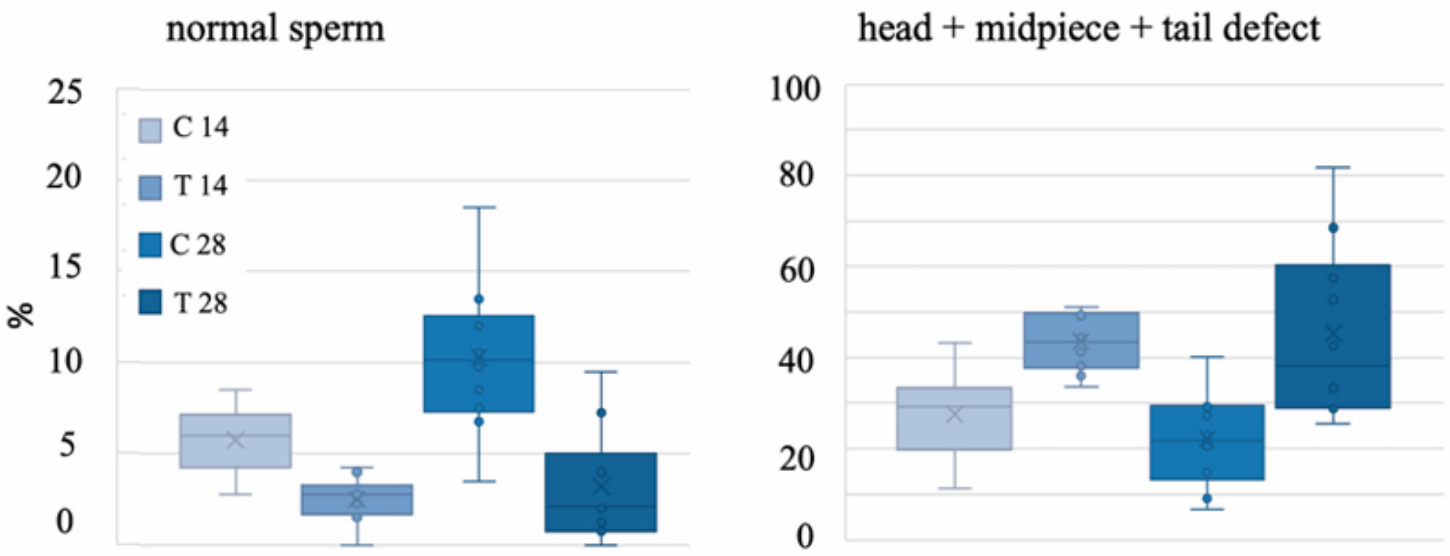
- Disease interactions One Health framework rodents, humans, domestic animals, food safety and environment
- South Africa urbanised townships

Chemosterilant + plant extract (ContraPest)

- Active ingredients are 4-vinylcyclohexene diepoxide (VCD) produced during the manufacture of rubber tyres and plant-based compound triptolide from thunder god vine
- VCD is carcinogenic industrial occupational health hazard, triptolide also known to be toxic
- Laboratory trials show that VCD depletes primordial ovarian follicles, triptolide damages both male and female reproductive systems in laboratory studies
- VCD can have permanent irreversible effect after prolonged exposure, triptolide at a high dose causes acute impacts, low dose chronic exposure also leads to tissue damage
- Delivery efficacy is questioned with limited published work under realistic conditions

Chemosterilant + plant extract (ContraPest)

- Reduces sperm quality in common voles
- No other consistent impact of 14/28-day treatment



Jacoblinnert, K., *et al*. (2024) Effects of an Anti-Fertility Product on Reproductive Structures of Common Vole Males and Residues of Compounds. *Biology* 2024, *13*, 450.

- Contrapest trials in New York City, Washington DC… have not been successful (*pers. comm.* Bobby Corrigan)

Immuno-contraception

- Immuno-contraceptive vaccines delivered by injection for larger animals (PZP, ZonaStat, GonaCon) are effective but not practical for rodents which need oral delivery
- Ongoing work to develop a food-based GnRH for the invasive grey squirrel in the UK
- Research to develop grey squirrel-specific contraceptive delivery is advanced, including potential to deliver contraceptive to >70% of a population

  Beatham, S. E., *et al*. (2024). An assessment of seasonal bait uptake by individual grey squirrels to develop a delivery system for oral contraceptives. *Pest Management Science*, 80(11), 5597–5607.

- High public support to help conserve red squirrels

  Dunn, M., *et al*. (2021) The red zone: Attitudes towards squirrels and their management where it matters most. Biological Conservation, 253, 108869.

- Greys outcompete native reds
- Greys transmit squirrel pox to reds
- Greys have major role in Lyme disease ecology
- Greys debark trees, eventually killing the trees
- Greys reduce songbird diversity

Immuno-contraception

- Immuno-contraceptive vaccines based on pox vector-GnRH vaccine

THE AMBER & ADAM
TARSHIS FOUNDATION

Novel solutions to control animal overpopulation

The Tarshis Foundation is actively advancing therapeutics for disease control and reproductive management in wildlife, stray, and companion animal populations.

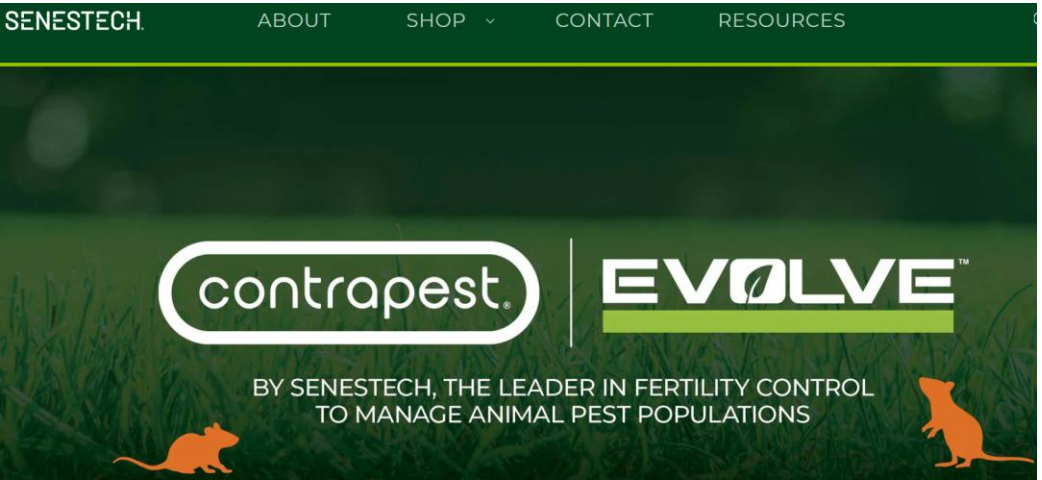
DEVELOPING NON-SURGICAL STERILIZATION SOLUTIONS

The Tarshis Foundation is working to develop cost-effective single dose immunocontraceptives for wild animal and companion animal populations.

Current efforts involve the identification of targeted species-specific viral vectors that could be used to distribute future contraceptive therapeutics to animal populations in a safe and controlled manner.

Other products sold or in development

- Cotton seed oil. Contains gossypol – can cause infertility in most animals. Needs to be continuously delivered. Serious known toxicities. Evidence of efficacy in field conditions is lacking, may be causing mortality. Sold in USA as Evolve.
- Thunder god vine extract. Contains triptolide, triptonide and derivatives. Serious known toxicities. Potent anti-inflammatory, anti-tumour but clinical application severely limited by high toxicity and narrow therapeutic window. Evidence of efficacy in field conditions is lacking, may be causing mortality. Trialled in USA as GoodBites.
- Ethane dimethane sulphonate. No field trials yet, but could be a good contraceptive candidate from lab work showing impact on both sexes, good palatability, low toxicity
- New Zealand research on rat-specific sterilising chemical



20+ years research using synthetic estrogen and progesterone (EP-1) – as used in human birth control and HRT

- Synthetic hormones used in human contraceptives for many decades with excellent safety and known modes of action
- Managing Mongolian gerbils driving plague outbreaks and dust storms over Beijing
- Rapid breakdown of compounds by micro-organisms in water/soil and UV light
- Minimal non-target impacts (birds, reptiles, fish, invertebrates, plants)
- (EP-1) using quinestrol and levonorgestrel has been evaluated against 13 rodent species including house mouse (*Mus musculus*) and the black rat (*Rattus rattus*)
- Impact varies by rodent species, sex, dose and ratio of quinestrol and levonorgestrel in food baits, but works in all so far tested – 30+ publications
- Palatability and production cost are comparable to rodenticides
- Trade-offs: reversibility of effect vs. safety to non-targets, reduction vs. eradication, not enough research on environmental and non-targets impacts

UK-China-Tanzania collaboration for EP-1 research in sub-Saharan Africa

AntiFert

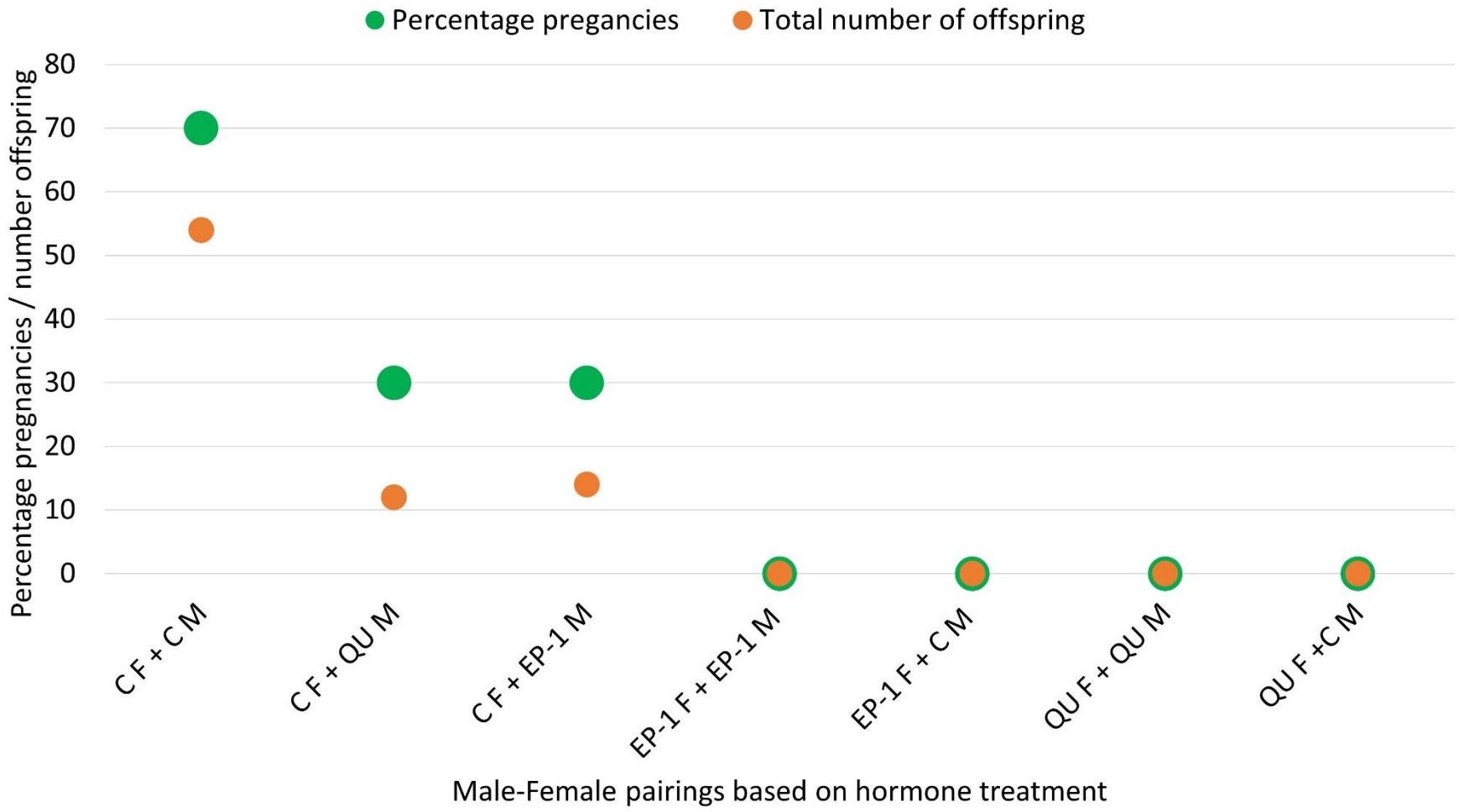
Control of Rats and Mice with Antifertility Pellets
Kiuatilifu cha AntiFert kudhibiti panya kwa kuzuia uzazi

Selemani, M., Makundi, R. H., Massawe, A. W., Mhamphi, G., Mulungu, L. S., & Belmain, S. R. (2022). Impact of contraceptive hormones on the reproductive potential of male and female commensal black rats (*Rattus rattus*). *Integrative Zoology*, *17*(6), 991–1001.

Impact on *Rattus rattus* reproduction

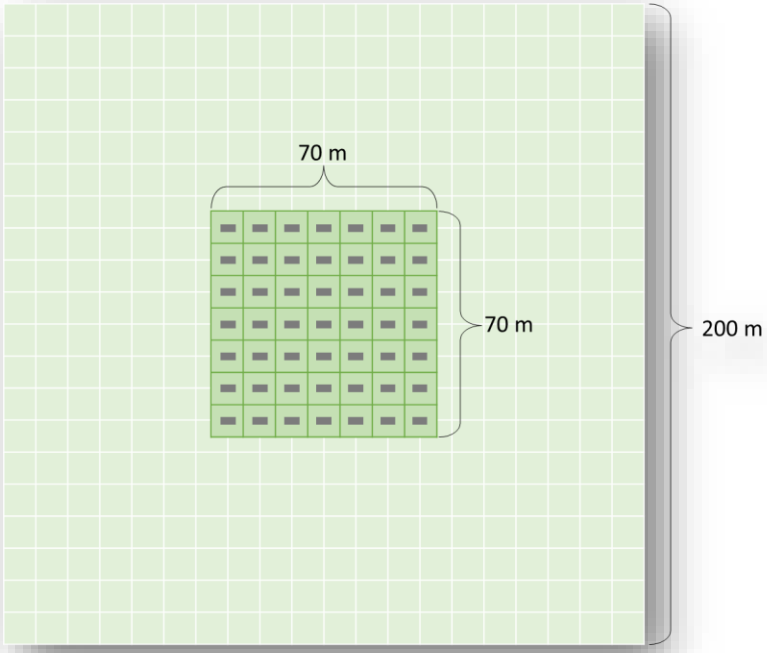
Effect of two contraceptive baits (QU 50 ppm and EP-1 50 ppm) fed to black rats on successful pregnancy from male-female pairings (n = 10). F = female, M = male, C = untreated control bait, QU = bait containing quinestrol at 50 ppm, EP-1 = bait containing levonorgestrel + quinestrol at 50 ppm.

- Untreated median litter size of 8 pups
- Untreated female with a treated male reduced pregnancy rate to 30% with median litter size of 4 pups
- No pregnancy with treated females



Impact on *Mastomys natalensis* populations

Imakando, C. I., Fernandez-Grandon, G. M., Singleton, G. R., & Belmain, S. R. (2022). Impact of fertility versus mortality control on the demographics of *Mastomys natalensis* in maize fields. *Integrative Zoology*, *17*(6), 1028–1040.



All fertility control products are endocrine disruptors

- Will rodent contraceptive baits cause problems for environmental contamination, non-target issues?
- Are products more dangerous than rodenticides and/or existing fertility control compounds such as 4-vinylcyclohexene diepoxide (VCD) or triptolide?
- How do we regulate? - veterinary medicines, pesticides, public health products, regulatory avoidance mechanisms
- Fertility control needs to be delivered to at least 70% of a population to have any impact on population reproduction rate – measuring this in an urban area is extremely complicated and has not been done with any existing rodent contraceptive products
- Fertility control will not solve issues inside houses, warehouses, food manufacturing, restaurants, supermarkets, hospitals
- Fertility control may work well to lower populations in agriculture with cyclic outbreak population dynamics and to prevent zoonosis spill over events

Rodent pest management will increasingly be held to account on animal welfare but we still need evidence of contraceptive efficacy

- How do we assess the relative importance of animal welfare in context of impact on human suffering caused by rodent damage to health, food and nutrition security, infrastructure safety?
- How do we deliver rodent contraceptives in context of public perceptions on non-targets such as Flaco the Eurasian eagle owl in NYC, low public awareness about rodent impacts through a lens of social justice
- Rodent pest management has problems with exploitative gimmicks where using rodent contraceptives are being driven by emotion, not evidence

Fertility control in rodents – what next?

- Increased interest in developing rodent contraceptives, new products are coming but still need much research and then regulatory approval
- Corporate interest remains low and will probably remain low until regulatory pressure extremely restricts poison use
- Evidence of efficacy with current commercial products in the USA is lacking
- Product development research needs to focus on scenarios where no eradication is needed
- Test efficacy in real world conditions
  - Bait uptake in population context, is it higher than 70%?
  - Rodent abundance/movement and zoonosis
  - Replicated evidence that rat harms are reduced
  - Environmental/non-target safety

Thank you for listening

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