# Exhibit your thesis: Designing a research poster

For UC Graduate School | Te Kura Tāura

*Dr Julie Wuthnow*

*Pokapū Pūkenga Ako | Academic Skills Centre*

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## Purpose

- What is the purpose of posters
  - Generate interest in your research
  - Communicate key messages in a clear, concise, *visual* way
  - Start conversations (literally)

Stand up and be counted!

Photo by Martin Arusalu on Unsplash



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## Possible uses for these visual tools

- To display in your department
- As a “tiny text” to organise your thoughts for writing (Thomson, 2019) or an “illustrated abstract” (Krausman & Cox, 2018)
- To present at conferences (our focus today)
- To submit to the Graduate School | Te Kura Tāura competition!



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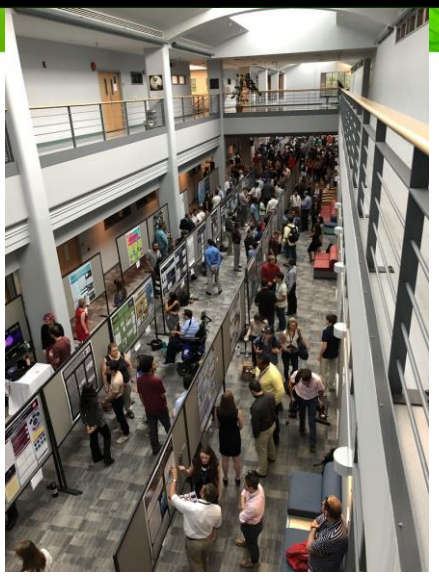
## **CONFERENCES:** You’re competing for attention



Your visual presentation needs to:

- Stand out
- Communicate substance
- Keep things simple

Photo credit: 2018 Summer Interns: poster session by goddard studio 13 under CC BY 2.0



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## Make your message EASY and FAST to interpret

- Title visible from 2-3 metres away
- 1-3 key takeaway points
- Only include context/background information that your audience must know to understand your work
- Viewers are most interested in your **findings** and **conclusions** (or hypotheses/expected findings if in earlier stages of research)
- Communicate relevance (so what?) to specific audiences

Why should I care?
Image by PublicDomainPictures from Pixabay



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## Keep it short and sharp

- Minimise reading:
  - Emphasise figures, photos, bullet points
  - Use paragraphs and tables sparingly
  - Keep word count as low as possible. Think of it as a visual abstract (Rossi, 2018) and aim for 150-250 words
  - Remember: Your poster is an ***invitation to further conversation***, so only include essential detail (including your contact information)

Your audience shouldn't need binoculars



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# Additional design considerations

- Ensure good colour contrast
- Make use of white/negative space
- Keep fonts, colours and design elements simple and non-distracting
- Create balance within and between different sections
- Ensure there's a clear and logical pathway



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## EFICACY OF POG FARTS AS A LETHAL TREATMENT AGAINST POPULATIONS OF *MORTUUS OVIS*: PRELIMNARY FINDINGS

Rhianna Pedwell[a], James Hardy[a], Susan Rowland[a]
[a]The University of Queensland, St Lucia QLD 4072, Australia

### Introduction

For human safety, zombie sheep hordes have been a threat for the last 5 years, and it is estimated that more than 67% of all domesticated sheep on the planet have been infected. There are no effective management strategies for the zombie threat, and many humans under in outbreak areas have resorted to using physical violence against the zombies to cull the population. This includes both the use of hand-held weapons such as knives and machetes, as well as automatic weapons such as rifles and machine guns. In 2015, Dotman reported his experience in dealing with zombie sheep (Mortuus ovis Benson) created by his neighbour, Benson, by employing his pet Pug (Canus lupus familiaris) as a means of defence. Specifically, the Pug's farts were lethal to all of the zombie sheep on Grandma's farm, with none of the eight left 'alive'. Extensive post-mortems were conducted on the zombie remains, with tissue samples of the brain, muscle, digestive tract, eyes, and skin collected and stored for research by the Centre for Research into Unnatural Pheonomena (CRUP). These post-mortems revealed the farts from the Pug acted as a neurotoxin against the sheep, that is they caused wide-spread tissue damage and rapid cell death. Like those who had used hand-held and automatic weapons, this further confirmed the theory that targeting the head is the most effective strategy for controlling zombie sheep. This study is the first to optimize the use of farts from pugs as a method for controlling M. ovis. Our laboratory conducted preliminary testing into the generation of farts in Pugs, by feeding them high-meat, high-sulphur, and high-fibre diets. The high-sulphur diet was the most effective in producing Pug farts, and it was also least likely to cause the dogs gastrointestinal distress (other than extra gas). Eggs, from chickens, are known to be high in sulphur. Therefore, we fed a group of Pugs a no-egg, low-egg, or high-egg diet and measured fart production. We predicted feeding pugs a high-egg diet would cause them to produce farts capable of causing M. ovis neural cell damage. Standard equipment was used to measure fart production. We took samples of the farts and sprayed them over neural cell cultures from M. ovis, to test if the farts from each diet had enough potency to induce neural cell death.

### Materials and Methods

| Treatment Group | Daily Diet | |
|---|---|---|
| | Eggs Fed | Standard Diet |
| No-egg Diet (NED, n = 4) | 0 | Water supply, 250g dry food |
| Low-egg Diet (LED, n = 4) | 1 | Water supply, 250g dry food |
| High-egg Diet (HED, n = 4) | 3 | Water supply, 250g dry food |

**Pugs**
Our sample for this study were 12 adult Pugs who passed a health check and had no known gastro-intestinal diseases or conditions. Ethics approval for the use of these animals, the feeding of the diets, and the testing of the farts was obtained for this study. The Pugs were healthy, and from two litters of the same parents, with n = 7 pugs from the first litter aged 4 years and n = 5 pugs from the second litter aged 3 years. All animals were spayed. We fed each dog 250g of Pet Appetite Premium dry-food, and all animals had constant access to fresh filtered water. Animals were also fed free-range organic eggs sources from a near-by supermarket (name withheld). The eggs were boiled for 6 minutes on the day of feeding and allowed to cool completely before being fed to the test animals. Pugs were fed twice a day, receiving dry food in the morning at approximately 7 AM AEST, and the cooled eggs at approximately 7 PM AEST. Pugs in the no-egg diet received more dry-food at the second feeding. Pugs in the low-egg diet were fed 1 egg per day, and Pugs in the high-egg diet were fed three. After the feeding period, Pugs were assessed for general health once again and returned to their owners after a 24 hour period.

**Fart Collection**
Pugs were kept overnight in large enclosures to collect farts produced. Enclosures were fitted with an Odour-VacTM system that collects all farts produced post the second feed. The system works by extracting gas at 2-minute intervals and feeding this into a converter that condensed all gas that was 'scented' into liquid form. The volume of this condensed material was measured by the system and fed into a database for each enclosure.

**Sniffometer Reading**
After the three-day feeding period, total collected fart extract for each diet group was retrieved and labelled. Aliquots (2ml) of the fart extract for each group were prepared. An MG-2000 Sniffometer was calibrated for detecting sulphur using melted elemental sulphur. Aliquots of fart extract were applied to the highly sensitive Whiff-Pad and measured. The Sniffometer measured the amount of sulphur-containing compound in the samples using mass-spectrometry and then sending data through to its advanced olfactory software to be quantified against Human Sensory Standards. Level of fart smell was expressed using the Nasal Malodour Scale.

**Neural Cell Killing Assay**
Remaining samples of condensed fart were diluted to a 1:100 solution with purified water. M. ovis neural cell cultures were obtained from CRUP and grown at 37°C for 24 hours on media enriched with pig blood. Each plate was misted with 10µl of fart extract from each group and incubated at 37°C for 1 hour. Cell density was measured before and after the treatment using a neurocytometer. Based on M. ovis post mortem studies, the percentage of affected neurons must be above 80% to prove lethal.

### Results

Pugs fed the no-egg diet produced a total volume of 3.215853 ml of farts over the three day feeding period. Pugs fed the low-egg diet produced a total volume of 9.114825 ml of farts over the three day feeding period. Pugs fed the high-egg diet produced the most farts, with a total of 26.01495 ml produced. Table 1 shows the 12-hour total readings for each pug in each diet group. These totals were summed, to produce a daily total for each pug in each diet group. The total amount of farts for each pug over the three-day feeding period was also recorded.

The Sniffometer reading (Figure 1) shows a peak for all three treatment groups at the sniff-level for hydrogen sulphide. A small, constant level of dimethyl sulphide was also detected in each of the three samples. Farts extracted from the high-egg diet group showed hydrogen sulphide reading of 18.7 intensity units on the Human Sensory Standards scale (0-20). When converted to the Nasal Malodour Scale, this is indicative of a human being finding the farts from the HED group 'super' smelly. Pugs fed the low-egg diet also produced farts with a hydrogen sulphide smell intensity score of 12 units, which translates to an NSM rating indicating 'majorly' smelly farts. Farts from the no-egg diet group had a hydrogen sulphide intensity unit rating of 6.5, and when translated using the NSM scale this indicates the farts were 'really' smelly. None of the hydrogen sulphide peaks fell within the NSM scale ratings for 'a little bit' or 'incredibly' smelly.

Two of the three fart samples produced by the different diet groups were successful at inducing M. ovis neural cell death, shown in Figures 2-4. The fart sample produced by the no-egg diet group was able to induce cell death in more than 20% of the tissue sample. This is indicates non-lethality for this level of hydrogen sulphide. The fart sample produced by the low-egg group was also unable to induce a lethal amount of cell death in the tissue sample, with >65% of cells lost, based on neurocytometer readings. The sample from the high-egg diet group induced neural cell death in >82% of the tissue sample, and this is indicative of a lethal dose.

**Table 1**

| Test Subject | Day 1 | Day 2 | Day 3 | Total |
|---|---|---|---|---|
| NED1 | 0.10438829 | 0.104382039 | 0.053555678 | 0.264724 |
| NED2 | 0.25909 6683 | 0.666666667 | 0.250631568 | 1.175775 |
| NED3 | 0.450852059 | 0.351453168 | 0.459663256 | 1.24315 |
| NED4 | 0.277377718 | 0.205425987 | 0.056000681 | 0.533263 |
| Total | 1.092312749 | 1.328367881 | 0.795215563 | 3.215853 |
| LED1 | 0.669374505 | 0.508602547 | 0.509876543 | 1.712097 |
| LED2 | 0.829573336 | 0.656565657 | 0.711111111 | 2.197252 |
| LED3 | 1 | 0.93 | 1 | 2.93 |
| LED4 | 0.715232595 | 0.726985493 | 0.813267913 | 2.255686 |
| Total | 3.2938306856 | 2.84218665 | 3.0542555568 | 9.114852 |
| HED1 | 2.113131057 | 2.599809969 | 2 | 6.912941 |
| HED2 | 2.311132495 | 2.40140145 | 2.25857492 | 6.971189 |
| HED3 | 2 | 2 | 2.32323269 | 6.323233 |
| HED4 | 2 | 1.910883502 | 2.267898709 | 6.287782 |
| Total | 8.4232604432 | 8.721177971 | 8.949794299 | 26.09415 |

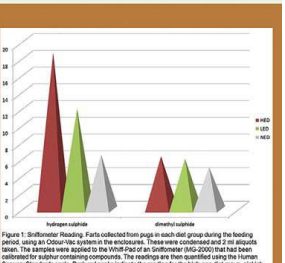


Figure 1: Sniffometer Reading. Farts collected from pugs in each diet group during the feeding period, using an Odour-Vac system in the enclosures. These were condensed and 2 ml aliquots taken. The samples were applied to the Whiff-Pad of an Sniffometer (MG-2000) that had been calibrated for sulphur containing compounds. The readings are then quantified using the Human Sensory Standards scale. Dark-red peaks indicate the reading for the high-egg diet group, pinkish-reddish peaks indicate those for the low-egg diet. The light pinkish peaks indicate the reading for the no-egg diet. A similar level of dimethyl sulphide was found along with the hydrogen sulphide.

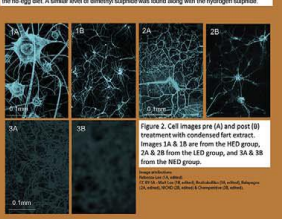


Figure 2. Cell images pre (A) and post (B) treatment with condensed fart extract. Images 1A & 1B are from the HED group, 2A & 2B from the LED group, and 3A & 3B from the NED group.

### Conclusions

Our results indicate pugs fed on low, or no-egg diets are not capable of producing farts that have a hydrogen sulphide smell intensity that equates to a lethal dose in M. ovis neurons. Rather our findings indicate that feeding pugs a high-egg diet causes them to produce a large volume of farts, with a hydrogen sulphide level of 18.7 smell intensity units and that this level of hydrogen sulphide is capable of inducing lethal neural death in M. ovis. It has been 5 years since the advent of M. ovis outbreaks, with more than 65% of the population of domesticated sheep now infected (1). Research attempts at developing a control mechanism have so far failed to produce adequate results. Our findings are the first indication of a viable method. However, there are limitations to these methods. First, it cost AUD $300 to cover the veterinary, enclosure building, and feeding costs of each pug. The equipment we used is also highly specialized, and state of the art, so this was also a huge cost for the project. Further limitations of the model include long processing time, as each pug took roughly 4 hours to digest the eggs completely, although this varied among individuals and therefore there is the potential for inconsistent results. We suggest an extension of this research would involve a bacterial expression model for producing high amounts of hydrogen sulphide, which could then be tested in vitro on captured M. ovis specimens and eventually lead to a solution.

(See reference info at end of slides)

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# Efficacy of Pug Farts as a Control Method for *Mortuus Ovis*

**Rhianna Pedwell[a], James Hardy[a], Susan Rowland[a]**
[a]The University of Queensland, St Lucia QLD 4072, Australia

## BACKGROUND

For human safety, zombie sheep hordes have been a threat for the last 5 years, and it is estimated that more than 67% of all domesticated sheep on the planet have been infected. There are no effective management strategies for the zombie threat, and many humans under in outbreak areas have resorted to using physical violence against the zombies to cull the population. This includes both the use of hand-held weapons such as knives and machetes, as well as automatic weapons such as rifles and machine guns. In 2015, Dotman reported his experience in dealing with zombie sheep (Mortuus ovis Bensun) created by his neighbour, Benson, by employing his pet Pug (Canus lupus familiaris) as a means of defence. Specifically, the Pug's farts were lethal to all of the zombie sheep on Grandma's farm, with none of the eight left 'alive'. Extensive post-mortems were conducted on the zombie remains, with tissue samples of the brain, muscle, digestive tract, eyes, and skin collected and stored for research by the Centre for Research into Unnatural Phenomena (CRUP). These post-mortems revealed the farts from the Pug acted as a neurotoxin against the sheep, that is they caused viido-spread tissue damage and rapid cell death. Like those who had used hand-held and automatic weapons, this further confirmed the theory that targeting the head is the most effective strategy for controlling zombie sheep. This study is the first to optimize the use of farts from pugs as a method for controlling M. ovis. Our laboratory conducted preliminary testing into the generation of farts in Pugs, by feeding them high-meat, high-sulphur, and high-fibre diets. The high-sulphur diet was the most effective in producing Pug farts, and it was also least likely to cause the dogs gastrointestinal distress (other than extra gas). Eggs, from chickens, are known to be high in sulphur. Therefore, we fed a group of Pugs a no-egg, low-egg, or high-egg diet and measured fart production. We predicted feeding pugs a high-egg diet would cause them to produce farts capable of causing M. ovis neural cell damage. Standard equipment was used to measure fart production. We took samples of the farts and sprayed them over neural cell cultures from M. ovis, to test if the farts from each diet had enough potency to induce neural cell death.

## MATERIALS & METHODS

*Pug Feeding and Fart Collection*
We fed 12 healthy pugs three types of diet for three days in a large enclosure with outside access. We obtained ethics approval for this study. Each group was fed a diet specified in Table 1 each day for three days. We used an Odour-Vac™ system in each enclosure to capture farts every 2 minutes for 12 hours after heeding for each day. Captured farts were converted to liquid form in a standard condenser, and the volume measured.

*Sniffometer Rating*
Aliquots of 2 ml pure fart extract were made for each treatment group and analysed using an MG-2000 Sniffometer calibrated for sulphur. The Sniffometer measured the amount of sulphur-containing compounds in a sample, then used advanced synthetic olfactory software to quantify the smell intensity against Human Sensory Standards. [4] The results were expressed qualitatively using the Nasal Malodour Scale (NMS) [5].

*M. ovis Neural Cell Death Assay*
Remaining condensed fart was diluted to a 1:1000 solution with purified water. Cell cultures grown from an M. ovis brain tissue sample were misted with 10 µl of fart extract from each group and incubated at 37°C for 1 hour. Cell density was measured before and after the treatment using a neurocytometer. The percentage of affected neurons must be above 80% to be considered lethal.

**Table 1:** Daily Diet Fed to Test Animals

| Treatment Group | Daily Diet | |
|---|---|---|
| | Eggs Fed | Standard Diet |
| No-egg Diet (NED, n = 4) | 0 | Water supply, 250g dry food |
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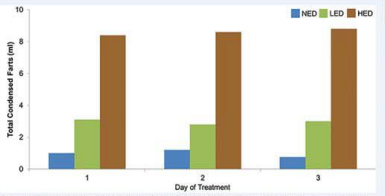


**Figure 1: Volume of Condensed Pug Farts during Feeding period.** Volume of condensed farts was measured using an Odour-Vac™ system in the Pug enclosures. Samples were taken at 2 minute intervals for 12 hours post-feeding for three days.

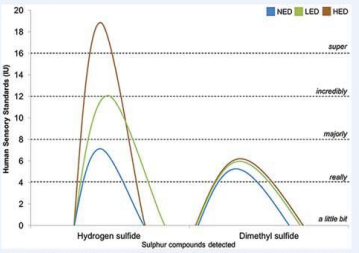


**Figure 2: Sniffometer reading for Pug fart samples.** Peaks show level of sulphur-containing compounds in 2ml aliquots of condensed Pug farts. Farts are measured on the Human Sensory Standards scale for 'smell intensity'. Nasal Malodour Scale ratings overlay the figure.

## RESULTS

Pugs fed the high-egg diet produced the most volume of farts, and the most intensely smelly farts (Figure 1). HED fed pug farts were also the most lethal *in vitro* against *M. ovis* neural cell culture. A total of 25.8 ml of condensed farts were collected from this group. This was nearly three times as many as the low-egg diet with a total 8.9 ml, and 16 times more than the no-egg diet at 2.95 ml.

The Sniffometer reading shows a peak for all three treatment groups at the Human Sensory Standards level for hydrogen sulphide. Farts extracted from the high-egg diet group showed a reading of 18.7 intensity units for hydrogen sulphide. This indicates a 'super' smell rating for the condensed farts on the NMS. Pugs fed the low-egg diet also produced 'majorly' smelly farts, with hydrogen sulphide measured at 12 intensity units. Farts from the no-egg diet group had a hydrogen sulphite intensity unit rating of 6.5, making these farts 'really' smelly.

*M. ovis* neural cell killing assays showed fart extract produced from HED fed pugs was lethal to >82% of all cell cultures (Figure 3). LED fed pugs produced farts that produced >65% cell death. Fart extract from NED fed pugs failed to affect the neural cell culture.

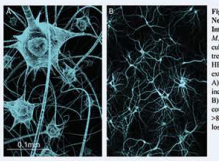


**Figure 3.** ***M. ovis*** **Neural Cell Imaging Results.** *M. ovis* neural cell culture before treatment with 10 µl HED pug fart extract (Image A),and after 1 hour incubation (Image B). Neurocytometer counts indicate an >82% cell density loss.

## CONCLUSIONS & FUTURE DIRECTIONS

Our results indicate pugs fed on a high-egg diet produce a large volume of lethally-smelly farts. We have shown that hydrogen sulphide at a smell intensity level of at least 18.7 (super smelly) is a viable option for inducing lethal neural cell death in *M. ovis*. The production costs associated with harvesting farts from Pugs, however, make this method for extraction unsustainable. Further limitations of the model include long processing times, and potential for inconsistent results. We suggest an extension of this research would involve a bacterial expression model for producing high amounts of hydrogen sulphide, which could then be tested for lethal factor *in vitro*. In the future, we hope to test this method on *in vivo* models, and bring humanity one step closer to ending the zombie plight.

## REFERENCES

1. WHO (2016) *Annual Zombified Livestock Report.*
2. Calvin, L & Lily, M (2015) *Five Years after the Outbreak: How are we dealing with the zombie scourge?* J Def Mech Sup, 7: 11, 210-235.
3. Dotman, I (2015) *My pug killed zombie sheep with its farts, yo.* J Extr Circ 18:9, 1992.
4. Department of Sensory Quantitation (2002) *New Human Standards for Pleasant and Offensive Odours.* Report published online.
5. Puddington, S. D. (1975) *The Nasal Malodour Scale: Applications in Clinical Practice.* J Med Hum 4: 5, 678.

## ACKNOWLEDGEMENTS

Funding for this study was provided by GZLC grant KFZ00345726. We would like to acknowledge Ari Sercha from the Centre for Research into Unnatural Phenomena, who provided cell lines. We are grateful to Wolfgang Burkington for his assistance in curing for the animal subjects. Image attributions: Rebecca-Lee (neuron A), Matt Lee (neuron B, CC BY-SA)

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# Pug farts are a viable control method for *Mortuus ovis*

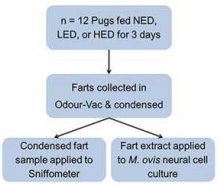
**Rhianna Pedwell[a], James Hardy[a], Susan Rowland[a]**
[a]The University of Queensland, St Lucia QLD 4072, Australia

## 1. THE NEED FOR ZOMBIE CONTROL

Zombie sheep hordes have threatened human safety for half a decade, with an estimated 67% of all domesticated sheep infected globally as of 2016 [1]. As yet, no viable control methods exist for the outbreaks, with many resorting to the use of automatic or hand-held weapons [2]. A case study by Dotman, I (2015), showed that Pug (*Canus lupus familiaris)* farts were lethal to 100% (*n* = 8) of zombie sheep (*Mortuus ovis* Benson). Post mortems revealed the hydrogen sulphide in pug farts had acted as a neurotoxin on the zombie horde, effectively a 'shot to the head' in smell form [3].

This study represents the first attempt to optimize the pug fart dose for use on current and future *M. ovis* outbreaks. Preliminary data showed foods high in sulphur to be ideal for producing pug farts high in hydrogen sulphide, with eggs causing the least upset tummies across a sample population (*n* = 4). We predicted feeding pugs a high-egg diet would cause them to produce farts capable of causing *M. ovis* neural cell damage.

## 2. FART COLLECTION & ANALYSIS

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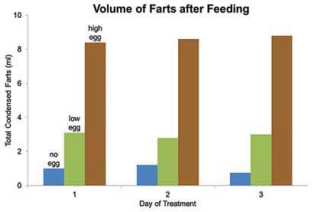
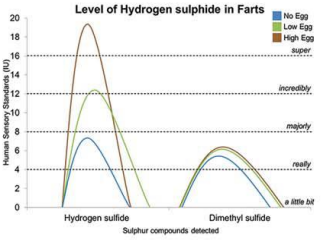
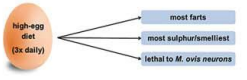



## 3. OUTCOMES OF FART ANALYSIS

- Pugs fed high-egg diet produced most farts with 25.8 ml
- Low and no-egg diet Pugs produced 8.9-2.95 ml farts
- Pugs fed high-egg diet produced 'super' smelly [4] farts with 18.7 intensity units (IU) of sulphur smell [5]
- Low-egg and no-egg diet Pug farts 'majorly' (12 IU) and 'really' (6.5 IU) smelly
- High-egg diet farts lethal to *M. ovis* neural cells *in vitro*
- Low-egg and no-egg farts not lethal to *M. ovis* neural cells



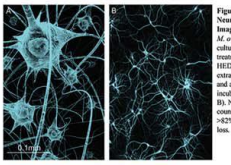




**Figure 3.** ***M. ovis*** **Neural Cell Imaging Results.** *M. ovis* neural cell culture before treatment with 10 µl HED pug fart extract (Image A), and after 1 hour incubation (Image B). Neurocytometer counts indicate an >82% cell density loss.

## 4. FUTURE USE OF FARTS

Our results indicate pugs fed on a high-egg diet produce a large volume of lethally-smelly farts. We have shown that hydrogen sulphide at a smell intensity level of at least 18.7 (super smelly) is a viable option for inducing lethal neural cell death in *M. ovis*. The production costs associated with harvesting farts from Pugs, however, make this method for extraction unsustainable. Further limitations of the model include long processing times, and potential for inconsistent results. We suggest an extension of this research would involve a bacterial expression model for producing high amounts of hydrogen sulphide, which could then be tested for lethal factor *in vitro*. In the future, we hope to test this method on *in vivo* models, and bring humanity one step closer to ending the zombie plight.

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Rebecca-Lee (neuron A), Matt Lee (neuron B. CC BY-SA)

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## About your text

- Revise, edit, get feedback (from someone outside the project), edit again, proofread!
- Consider give headings substance (not just “Methods”, for instance), but keep your audience in mind
- Avoid empty jargon & clichés. Be clear & specific using mostly simple language but use technical/specialist terms as needed
- See [Academic Jargon: Why It’s Evil and How to Crush It with 7 Simple Tips] for further information


**Weird Al Yankovic - Mission Statement**
**by alyankovic**
https://tinyurl.com/mrp5yv75



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## Beyond the poster: the hoped-for conversation

- Prepare an “elevator pitch” (if you’re on-site)
- Maybe a handout or data set?
- Be prepared to answer questions
- Your poster should be self-explanatory and provide contact information if posted online



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## Resources

- If you need help creating a poster in PowerPoint, consider using an AI tool such as ChatGPT to get instructions
- Canva provides customisable academic poster templates
- Images
  - Use your own graphs, charts and images if possible
  - See websites like Pixabay and Unsplash, or Creative Commons sites such as openverse for access to images in the public domain (i.e., available for you to use without violating copyright) and make attribution where required
- See "Six insights to make better academic conference posters" and "How to design an award-winning conference poster" for more information



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## References

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