DILUTED IN LIQUIDS

IN FRUITS OR VEGETABLES
IN USUAL OBJECTS
IN USUAL OBJECTS

IN USUAL OBJECT
CONCLUSION:
DOGS CAN SMELL ALMOST ANYTHING BUT WORK CONDITIONS ARE MOST OF THE TIME VERY DIFFICULT.
WE NEED MUCH MORE DEDICATED RESEARCH IN ORDER TO CONTINUE TO IMPROVE DOG OLFACTION CAPABILITIES

Actual knowledge on dog’s olfaction

1/ UPDATES IN DOG’S OLFACTION PHYSIOLOGY
2/ HOW TO UNDERSTAND ODORS
3/ HOW TO OPTIMIZE OLFACTION IN THE DOG
Can we optimize dog’s olfaction?

Canine Olfaction: Scientific research tracks

- Early determination of olfactory detection thresholds
- Knowledge on odorant molecules in the dog
- Improvement of olfactory aptitude through nutrition
- Quality of education, training
- Early aptitude-testing
FROM BEHAVIOUR TO VETERINARY MEDICINE, PHYSIOLOGY AND BIOLOGY

CAN WE IMPROVE DOG’S OLFACTION THROUGH BETTER PHYSIOLOGICAL KNOWLEDGE?
Explosives detection by sniffer dogs following strenuous physical activity
Irit Gazit, Joseph Terkel
Applied Animal Behaviour Science
81 (2003) 149-161

Department of Zoology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Ramat Aviv, Tel Aviv 69978, Israel

Effects of acute exercise on olfaction performance

1 Physical Exercise
2 Body Temperature
3 Necessary Search Time
4 Breathing Rythm
5 Sniffing Rythm
6 Detection Efficiency

Age-related changes in the olfactory system of dogs.
Hirai,T., Kojima,S., Shimada,A., Uemura,T., Saka,M. & Itakura,C.
Neuropathology and Applied Neurobiology (1996), 22, 531-539

- Dogs > 14 years old:
  - degeneration in the olfactory epithelium,
  - number of cells decrease
  - number of cilia of olfactory cells decrease
  - number of microvilli of supporting cells decrease
Can we improve dog’s olfaction through nutrition?

Effect of dietary fat source and exercise on odorant-detecting ability of canine athletes
Eric K. Altom, Gary M. Davenport, Lawrence J. Myers and Keith A. Cummins,
Veterinary Science
Volume 75, Issue 2, October 2003, Pages 149-155
### Effect of dietary fat source and exercise on odorant-detecting ability of canine athletes

**Eric K. Altom, Gary M. Davenport, Lawrence J. Myers and Keith A. Cummins,**

*Veterinary Science*

*Volume 75, Issue 2, October 2003, Pages 149-155*

#### Olfaction capacity of dogs post intense exercise

<table>
<thead>
<tr>
<th>Daily Physical Training</th>
<th>NO</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before « stress » test</td>
<td>10.7, 1.3</td>
<td>7.8, 1.4</td>
</tr>
<tr>
<td>After « stress » test</td>
<td>3.9 ± 1.4</td>
<td>8.1 ± 1.2</td>
</tr>
<tr>
<td>Olfaction modification</td>
<td>-63.6%</td>
<td>+3.8%</td>
</tr>
</tbody>
</table>

**Practical consequence**

**Without permanent physical training, stamina and stress generated by operation induce a strong decrease in olfactive capacities of dogs.**

#### Relationship Olfaction-Quality of Dietary Fats [data before « stress » test]

<table>
<thead>
<tr>
<th>Training</th>
<th>Standard NO</th>
<th>Standard YES</th>
<th>Unsaturated Fats NO</th>
<th>Unsaturated Fats YES</th>
<th>Saturated Fats NO</th>
<th>Saturated Fats YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 4</td>
<td>18.0</td>
<td>12.0</td>
<td>11.0</td>
<td>11.3</td>
<td>18.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Week 8</td>
<td>15.0</td>
<td>7.7</td>
<td>10.3</td>
<td>8.3</td>
<td>11.3</td>
<td>6.3</td>
</tr>
<tr>
<td>Week 12</td>
<td>13.7</td>
<td>4.7</td>
<td>10.7</td>
<td>9.0</td>
<td>0.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Practical consequence**

**Excesses of saturated fats / Insufficiency in polyunsaturated fats induce a progressive decrease in dog’s olfaction acuity.**
BY WORKING ON

- The quality of nasal mucus
  N-acetyl-Cystein
  Fluidification of mucus?

- The expression of the OR genes
  L Glutamine, L Methionine, L Alanine
  L Asparagine, L Cysteine

- The membrane transduction
  Omega 3 Fatty acids

- Orexigen factors
  Anti-leptins (to discover)

- The genomic transcription
  L Tyrosine

CAN WE IMPROVE DOG’S OLFACITION THROUGH HUMAN BEHAVIOURS?
By working on behaviour traits?

WILLINGNESS

Routine, memorisation

(Photos Auburn University)
By working on behaviour traits?

Human behaviour: vocal signals, lateralisation of human face

(Photos Auburn University)

By working on behaviour traits?

Human behaviour: vocal signals only

(Photos Auburn University)
By working on behaviour traits?

Human behaviour: visual signals only

BY TRAINING DOGS AS EARLY AS POSSIBLE?

TRUFFLES

MARIJUANA
Olfactive Search: Genetics and/or Training?

Rivières, 2004

Standard dog « compares » Dominant dog « incisive » Dominated dog « systematics »

BY A BETTER SYSTEMATIC VETERINARY SURVEY?
By working on operational methods?

Afghanistan: Improvised Explosive Devices (01/08)
Intensification of dogs’ work only on «at risk» zones

QUALITY INSURANCE
QUALITY INSURANCE

OPERATION INDIVIDUAL

PHYSICAL TRAINING

• If the operators “at the end of the line”
  • Traditionally QA is some kind of

DURING TRAINING

WRITTEN TRAINING

TRAINING AND

DEVELOPMENT OF

SUBSTANCES

EFFICIENT AND

BOOKLET

EVOLVING

WHY?

Mahalla Epreme, Albania 2003

QUALITY

SANITARY FOLLOW-

UP OF DOGS

METHODS OF DOG

SELECTION

WHY?

RETRAINING BEFORE

EVALUATION TESTS

QUALITY

INSURANCE

OVERSEE OPERA-

TION OF OPERA-

TION PROCEDURES

STANDARDISATION

OF OPERATION

PROCEDURES

PREPARENESS TO

OVERSEE OPERATION

MISSIONS

CONTINUING

EVALUATION TESTS

SURVEY OF REST

PERIODS

RETRAINING BEFORE

GOING BACK TO

WORK SESSION

PHYSICAL TRAINING

OF DOGS

MEDICAL SURVEY OF

DOGS

HOW?

WRITTEN TRAINING

PROGRAM

DEVELOPMENT OF

EFFICIENT AND

EVALUATING

WORKING METHODS

TRAINING AND

OPERATION INDIVIDUAL

BOOKLET

AVAILABILITY OF ALL

NECESSARY

SUBSTANCES

DURING TRAINING

PHYSICAL TRAINING

OF DOGS

SURVEY OF DOG HANDLERS

SELECTION OF DOGS

METHODS OF DOG

SELECTION

SANITARY FOLLOW-

UP OF DOGS

QUALITY

INSURANCE

SURVEY OF DOG HANDLERS

SELECTION OF DOGS

METHODS OF DOG

SELECTION