

Release Notes 2021-09-29 : This report summarizes Brownie in an informal style as an end-to-end test of the software and procedures. It provides an example of useful "real world" data collection in a more familiar setting than a formal laboratory. Hopefully this will be a citation in a later tech report or journal article elaborating the science behind the work. While this seems to document the important points, it is not a finished "manuscript" but it became good enough to serve the intended purpose and I have other stuff to do. Numbers and units in tables were spot checked but software is still being debugged. **For information only, not for use for any particular purpose. Caveat emptor.**

Supplement Usage Including Vitamin K by a Heartworm Positive Pregnant Pit Bull and Her Puppies

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(Dated: September 29, 2021)

This work describes the uneventful chronology of a heartworm-positive pit bull mix, Brownie, from early pregnancy to after Diroban treatment. Her vitamin intake, recorded as MUQED data, was notable for including significant vitamin K (10mg/60lbs/day) among a large variety of other nutrients. While difficult to attribute any harms or benefits to the overall diet or specific components, there was no obvious safety signal. Vitamin K sometimes generates controversy or concern due to association with pathological clotting. Antithrombotics may be indicated in the case of heartworm and coagulation or hemodynamics in general appear to be open topics in pregnancy. While generally unremarkable, she did experience fluid accumulation immediately after her spaying surgery two months after Diroban treatment. After emergency removal, she recovered the next day and continues to do well. Additional topics of this work include novel tools for data collection and diet optimization. It serves as proof of concept to further motivate the arguments, debug the related software, and test the tools and approaches employed. Details related to vitamin K and coagulopathies may be discussed in another work describing multiple similar cases or chronical results from better controlled settings.



FIG. 1: Brownie and some puppies in the yard. photo credit either me or Barbara Cade

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1. INTRODUCTION

This work describes the complex vitamin consumption of one dog, Brownie, who recovered uneventfully from a heartworm infection while pregnant. While not all that noteworthy in isolation, it adds data to several unresolved topics. The utility and safety of some vitamins for the healthy and sick remain as areas of controversy within scientific and other communities. This is certainly true for companion animals with compromising conditions such as heartworm infection or pregnancy. In human medicine, there is a confusing unresolved limitation of anti-coagulants to safely treat conditions in which coagulopathy is a prominent component. Despite significant formal and controlled lab and clinical investigations, pandemics such as the current covid-19 remain as social burdens prompting the development of popular nutritional ideas with no good ways to test. Vitamins may interact strongly with each other and the dietary background making combination and mutual exclusion important considerations in obtaining a specific response.

This work adds some data to these issues by documenting a complicated supplement history demonstrating the ability to do this in an informal setting. Today, with home computers and automated data capture methods, there is some hope that informal "real world" data such as this can be captured and explored with tools ranging from AI to human intuition hoping to make the fortunate discovery of an informative accident or anomaly after looking at megabytes of boring data. While various phone and imager methods exist for data collection, this work reminds us that a simple desktop computer and keyboard work too.

The most notable nutritional aspect of Brownie's story is that the vitamin supplementation included significant vitamin K even though vitamin K antagonists are often considered in similar patients. Prior work has described attempts to optimize the diet for another heartworm positive dog, Happy [5] , who recovered uneventfully after Ivermectin/doxycycline treatment with significant vitamin K although her cough trends were confusing. Another dog, Andy, recovered from a much more severe heartworm infection but did suffer excessive fluid accumulation before being lost to follow up [4] although second hand information suggests he made a complete recovery. There was never any indication that his exercise tolerance decreased even with the significant weight of the fluid. Related work with older dogs suggested some less trendy vitamins that may be useful against the current human epidemic covid-19 [2] [3] and the ideas specific to coagulation or vitamin K in other contexts were also elaborated in shorter works. Beneficial effects may result from increased clotting velocity [6] and a hypothesized non-monotonic response curve [8] . All of these relate to age correlated conditions in humans.

Her diet history is presented as monthly summaries along with various observations extracted from the MUQED [7] data. As the chronology was largely uneventful, the only conclusions that can be considered relate to the safety of the diet as an addition to commercial kibble and canned dog foods.

2. DESCRIPTION

Brownie, pictured with puppies in Fig. 1, arrived here in mid Jan 2021 heartworm positive and was quickly determined to be pregnant. Her event timeline is presented in Table I. Brownie's weight varied greatly of course but after Diroban was estimated by the vet's office at 49 pounds with an age of about 7.5 years. One eye appears injured and opaque, see Fig. 3, and she has a lump , see Fig. 2, (both photos taken in 2021-09 after Diroban treatment) that did not appear to impede nursing. She gave birth on Feb 14,2021. Of twelve puppies delivered, one died shortly after birth, one was born a day later presumably stillborn, and another died apparently after Brownie sat on him. Two eyelid deformities were noted but otherwise the puppies were not remarkable. Estimated total puppy weight about 72 pounds at 6 weeks. On April 11(8 weeks) , weights ranged from 14 lbs for the largest (Chloe) to 11.1 lbs for the smallest (Rosie) with total weight estimated at 117 lbs.

Date	Event or Observation
2021-01-12	Brownie arrives
2021-02-14	Delivers 11 puppies
2021-02-16	Additional puppy apparently stillborn
2021-03-28	(circa 6 weeks) Puppy weight approx 72 lbs
2021-04-11	(8 weeks) Puppy weight approx 117 lbs (2 weeks later)
2021-07-13	Diroban
2021-09-13	spay, weighs 49.1 lbs, ER for emergency bloat and fluid.
2021-09-14	returns home seems normal.
September 29, 2021	continues to be fine.

TABLE I: Most notable events



FIG. 2: Brownie belly with mass, 2021-09-25

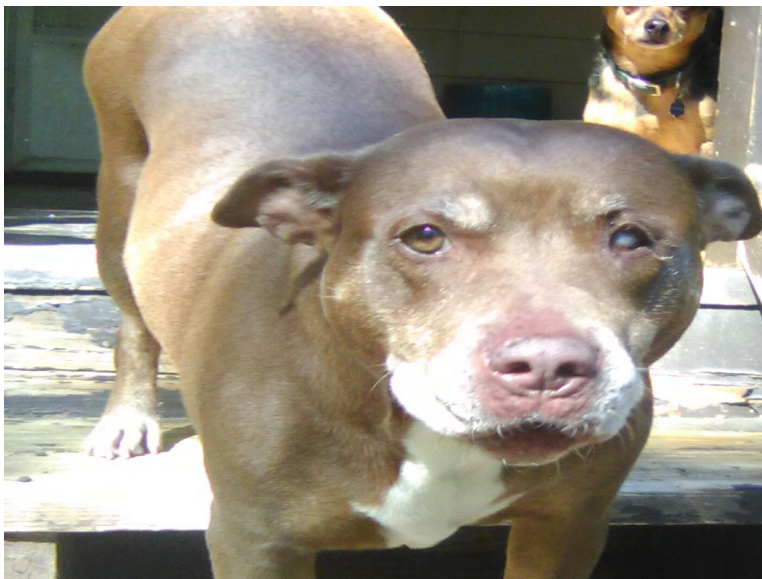


FIG. 3: Brownie has opacified eye, 2021-09-25. Photobomber is Claire.

3. DIET

Diet and related observations were recorded in MUQED format [7] although significant gaps and omissions exist in the data such as her daily kibble and canned food meals. Monthly summaries are shown in Appendix A. Most terms are common but several local private abbreviations are used. Some have been translated for the table and others simply footnoted illustrating the flexibility of MUQED. Vitamins were added to 2-3 snacks per day. Details of snack preparation were described previously [5]. Briefly, the snack consisted of fresh human food (various combinations of chicken, ground beef, shrimp, fish, eggs, carrots, spinach, salmon) with supplements rotated to avoid competition and incompatibilities between vitamins. For example, BCAA's and SMVT substrates were rotated and rarely more than one of each given at the same time. The exclusion criteria and rotation strategy make preparation more complex and data presentation more difficult without averaging.

Amounts were either measured based on contents per capsule or in the case of bulk supplements volume was measured and converted to weight with presumed densities. MUQED allows various units including local or "made

up” units as long as conversion factors are supplied. Most of these were converted to metric mass.

Some specific instance of the above caveats with the table in Appendix A may be worth noting. While capturing most of the supplements, normal kibble meals were not recorded for her and there are several gaps of 1-2 weeks during which time she got essentially no supplements. While most private abbreviations are converted to popular units or footnoted, a few were left unexplained. Lecithin was recorded in made up ”lecu” units before converting to mg although dosing amounts did not change. Like some other components, amount was not thought to be critical and recording became more precise as software improved. A conversion for most of these made-up units exists however it is not always included in the MUQED noun specification. Chicken was given as either boneless skinless breasts or thighs abbreviated as ”cbbroth” or ”ctbrothbs” respectively. While some combination items were ”exploded” into components, the multi-B vitamins indicated as ”B-100” and ”multiB” were not broken down although the ingredients are included in the MUQED entries. Most averages fluctuated due to inconsequential issues although the garlic was stopped during nursing out of concern it could make the milk less palatable.

Classes of supplements included:

1. Essential Amino Acids
2. Important Amino Acids not always considered essential
3. B-vitamins including SMVT substrates
4. Trendy vitamins such as A,C,D with exception of E
5. Metals - copper, zinc, magnesium, manganese
6. Digestive/Solubility aids- potassium chloride, citric acid, lecithin

In the prior discussion of Happy, her cough began to increase along with the addition of aromatic amino acids to her diet but many other events occurred too. There is no indication Brownie’s condition ever deteriorated, except briefly after spay surgery, although she received a broad mix of essential amino acids. Happy has since begun coughing again and that may still relate to aromatic amino acids but for idiosyncratic reasons.

The daily vitamin K intake is summarized in Fig. 4. The maximum amount is about 28mg normalized to 1 in the plot. This was normally a combination of bulk K1 in 10mg servings and K2 from 15mg capsules. Most of the vitamin K was from K1 due to ease of use and cost but Happy did well with mostly K2. Despite possible safety concerns, no indication was seen of reduced exercise tolerance that could relate to pathological clotting.

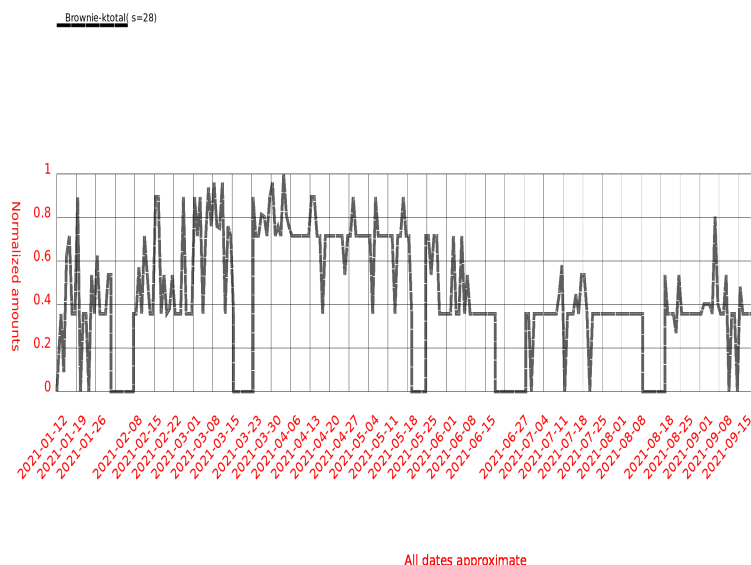


FIG. 4: Normalized daily total vitamin K combining K1, normally in 10mg doses, and K2 in 15mg increments. Full scale is about 28mg.

4. DISCUSSION

Its important to remember that biological systems such as people and animals are complex and adaptable to a range of situations. Food components or vitamins are not acting in isolation and all of them have various properties beyond whatever is trendy. These components can interact through many known but ignored features. In particular, they may have solubility or other physical parameters that interact with an impaired digestive system or other contents. They may share transporters or otherwise compete or regulate each other. Tests of isolated nutrient with small putative effects may require a lot of averaging to extract a small safety or efficacy signal. A complicated set of things that produces a larger result provides a stronger signal and maybe quicker characterisation. Clinical trials of single vitamins often fail with no useful results but a higher signal may be produced with a "best guess" combination. With Happy, a diet containing additional copper was eventually eaten less well by multiple dogs until zinc was added too. Competition for transporters as may occur with amino acids or SMVT substrates was a design consideration in the diet and possibly combining all of these into uniform meals may not produce similar health effects as rotation.

The physical properties and possible GI limitations were also considered. Lecithin was added consistently to help with fat soluble components. Dogs eat a lot of indigestible matter and ingredients to improve stomach acid included potassium chloride, citric acid, and histidine. In humans, elderly or compromised GI systems lead to accumulation of debris that can be removed with diet coke possibly due to the low pH and phosphate content [1]. No source of phosphoric acid was included for this diet although the lecithin may contain significant phosphate. This may be an interesting function to add to later diets.

5. CONCLUSIONS

There is no indication the vitamin mix was at all deleterious to Brownie or her puppies. The fluid accumulation and bloat after her spay surgery remains unexplained but appears to be an acute incident related to the surgery. Any impact of the diet is unknown. Brownie is the third dog with heartworm receiving vitamin K along with a "kitchen sink" of nutrients similar to a set which appears to benefit older dogs. There may be cases where high doses of vitamin K can result in coagulopathy but right now data are consistent with the high-dose plateau of the curve presented previously [8] .

6. SUPPLEMENTAL INFORMATION

6.1. Computer Code

```
2690 vi brownie2a.txt
2691 ./run_linc_graph -dt-mo brownie2a.txt
2692 texfrag -include xxxtable
2693 ./backup

make_dt_mo()
{
  EXE="./mjm_linc_graph.out"
  DATAFILE="/home/scripts/script_data/cases/out/dog_daily.txt"
  DATAFILE="/home/scripts/script_data/cases/out/dog_glob.txt"
  #PIN="pin_andy.txt"
  PIN="$1" # spiceya.txt"
  OFILE="xxxtable"
  CODE=0x03
  # for using the glob parser
  CODE=0x0b
  #FOODS="Iodine K1 K2 furosemide diroban tyrosine"
  # TODO the new files have units and need bit 8 set although crashing with
  # logic error could be improved...
  CMD="$EXE -cmd \"read-ragged in $DATAFILE\" -cmd \"read-ragged p $PIN\" -cmd \"snacks-time $OFILE $CODE in
  p 4\" -quit 2>xxx"
```

```

echo "$CMD"
echo "$CMD" | bash -s

} # make_dt_mo

cat brownie2a.txt
maxsz 50
datemin 2019-08-01
#datemin 2021-07-01
datemax 2021-10-01
dogs Brownie
# only with the multiple dogs
#side-by-side 2
#side-by-side 2
scope
variable datemin mjmdatemin
variable datemax mjmdatemax
variable footnotes mjmsuperscripts
caption A summary of most dietary components and events for selected months between \\mjmdatemin and \\
mjmdatemax. Format is "average daily amount ;maximum; days given/ days in interval ". Units are
arbitrary except where noted. Any superscripts are defined as follows: \\mjmsuperscripts
foodalias vmap xxx 0.0
#foodalias ctskin ctbrothbs 1.0
#foodalias ctbroth ctbrothbs 1.0
#foodalias 11PC KCl/citrate 1.0
#foodalias 11KC KCl/citrate 1.0
foodalias multiB B-multi 1.0
#datealias 2020-12 "2020-12 Dec"
#datealias 2021-05 "2021-05 May"
datealias 2021-06 "2021-06 June"
datealias 2021-07 "2021-07 July"
datealias 2021-08 "2021-08 Aug"
datealias 2021-09 "2021-09 Sept"
#datealias 2021-08 "2021-08 Aug"
grouping vitamin 2 "{\\bf VITAMIN}"
grouping medicine 3 "{\\bf MEDICINE}"
grouping outcome 4 "{\\bf RESULT}"
grouping food 1 "{\\bf FOOD}"
grouping 0 "{\\bf UNCLASSIFIED}"
superscript biotin(mg) a
superscript pantothenate(mg) a
superscript Iodine(mg) a
superscript lipoicacid(mg) a
footnote a SMVT substrate. Biotin, Pantothenate, Lipoic Acid, and Iodine known to compete.
superscript lysine b
superscript lysinehcl b
superscript arginine b
#footnote b Arginine and Lysine known to compete.
superscript b7ngnc c
superscript b10ngnc c
superscript b15ngnc c
superscript b20ngnc c
footnote c hamburger with varying fat percentages- 7,10,15,20, etc. .

marchywka@happy:/home/documents/cpp/proj/linc_graph$

```

7. BIBLIOGRAPHY

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Acknowledgments

1. Pubmed eutils facilities and the basic research it provides.
2. Free software including Linux, R, LaTeX etc.
3. Thanks everyone who contributed incidental support.

Appendix A: Monthly Diet Supplement Summary

Name	2021-01 Jan	2021-02 Feb	2021-03 Mar	2021-04 Apr	2021-05 May
FOOD					
KCl(tsp kcl)	0.3;0.25;20/20	0.56;0.25;21/21	0.76;0.25;25/25	0.67;0.25;30/30	0.38;0.25;27/27
aimeal	0.05;1;1/20	0.06;1;1/21			
b10ngnc ^(c)	0.46;1;6/20	1.1;1;10/21	1.1;1;11/25	1.4;1;16/30	0.74;1;8/27
b15ngnc ^(c)		0.048;1;1/21	0.12;1;3/25		
b7ngnc ^(c)	2;1;20/20	1.7;1;17/21	1.8;1;17/25	1.6;1;18/30	2.2;1;21/27
carrot	2.2;1;20/20	2.1;1;21/21	2.1;1;25/25	2;1;30/30	2;1;27/27
cbbroth	2.4;1;20/20	2.4;1;21/21	1.7;1;23/25	2.6;1;29/30	2.9;1;27/27
citrate(tsp citrate)	0.27;0.25;19/20	0.56;0.25;21/21	0.76;0.25;25/25	0.67;0.25;30/30	0.38;0.25;27/27
ctbrothbs		0.57;1;6/21	1.6;1;21/25	0.31;1;5/30	
eggo3	0.47;0.5;19/20	0.98;1;20/21	1;1;25/25	0.55;0.75;29/30	0.48;0.5;26/27
garlic	0.9;1;10/20		8.00e-03;0.1;1/25	1.8;1;23/30	2.4;1;27/27
oliveoil(tsp)		0.048;0.25;3/21			
salmon	0.22;1;4/20	0.19;1;5/21	0.15;1;3/25	0.42;1;8/30	0.093;1;4/27
shrimp(grams)	9.1;45;13/20	28;40;18/21	39;349;23/25	20;50;25/30	20;30;26/27
spinach	1.1;1;11/20	1.8;1;19/21	1.2;1;15/25	1.3;1;20/30	1.9;1;27/27
tuna(oz)	0.2;1;5/20	0.071;0.5;2/21	0.024;0.5;2/25	0.042;1;2/30	
VITAMIN					
B-1(mg)	11;100;3/20	14;100;3/21	3.2;80;1/25	3.3;100;1/30	10;100;5/27
B-100(count)	0.072;0.25;6/20	0.39;1;8/21	0.3;1;8/25	0.11;0.75;5/30	0.15;1;7/27
B-12(mg)	0.15;2;2/20	0.09;1;3/21	0.12;1;3/25	0.13;2;2/30	0.11;1;3/27
B-2(mg)					41;100;11/27
B-3(mg)	15;35;9/20	34;70;11/21	14;70;5/25	21;70;9/30	49;70;16/27
B-multi					0.056;0.5;3/27
Cu(mg)	2.4;5;12/20	1.8;5;10/21	2;5;13/25	2.2;5;15/30	2.4;5;13/27
D-3(iu)	160;1000;8/20	429;1000;10/21	450;1000;13/25	405;1000;12/30	333;1000;9/27
Iodine(mg) ^(a)	0.022;0.25;2/20	0.098;0.3;8/21	0.18;0.5;13/25	0.084;0.5;5/30	0.056;0.5;3/27
K1(mg)	6.4;10;14/20	8.6;10;17/21	16;10;25/25	18;10;30/30	16;10;26/27
K2(mg)	4.5;15;6/20	5;16;7/21	4.4;15;7/25	2;15;4/30	2;15;4/27
Mg(mg)	242;400;12/20	364;400;19/21	424;400;25/25	377;400;28/30	385;400;26/27
Mn(mg)		0.095;2;1/21			
arginine(mg)	205;800;5/20	729;1600;17/21	801;800;22/25	600;800;21/30	810;800;26/27
biotin(mg) ^(a)	3.2;10;10/20	4.8;10;10/21	5.7;10;13/25	5.3;10;16/30	4.1;10;12/27
folate(mg)					0.037;0.5;2/27
histidinehcl(mg)	472;330;20/20	490;340;20/21	666;360;25/25	590;340;30/30	579;340;25/27
isoleucine(mg)	130;650;4/20	240;800;7/21	172;800;5/25	213;800;8/30	267;800;9/27
lecithin(lec)	2738;1200;20/20	4714;3600;21/21	6974;2400;25/25	450;2400;2/30	
lecithin(mg)				4909;1800;28/30	2900;1800;27/27
leucine(mg)	585;650;17/20	782;650;19/21	789;650;23/25	611;650;26/30	554;650;23/27
lipoicacid(mg) ^(a)	15;100;4/20	6;50;4/21	5.4;50;4/25	7.1;30;12/30	16;50;9/27
lysinehcl(mg)	2774;1300;20/20	2524;1300;21/21	2722;1300;25/25	3237;1.3e+04;30/30	2407;1300;26/27
methionine(mg)	114;500;6/20	179;250;15/21	255;250;24/25	93;250;11/30	130;250;14/27
pantothenate(mg) ^(a)	74;120;14/20	112;500;15/21	364;500;19/25	400;500;26/30	352;500;20/27
phenylalanine(mg)	433;500;18/20	478;500;20/21	530;500;25/25	487;500;29/30	500;500;27/27
taurine(mg)	1947;900;19/20	2544;900;21/21	2747;900;25/25	2716;900;30/30	2633;900;27/27
threonine(mg)	1170;1300;19/20	1253;1300;21/21	1319;1300;24/25	2409;1300;30/30	2311;1300;27/27
tryptophan(mg)	498;500;20/20	671;400;21/21	797;400;25/25	786;400;30/30	756;400;27/27
tyrosine(mg)	535;400;20/20	745;400;21/21	798;400;25/25	736;400;30/30	785;400;27/27
valine(mg)	615;800;17/20	876;800;19/21	1008;800;23/25	591;800;21/30	563;800;19/27
vitamina(iu)	2000;1e+04;8/20	2674;1e+04;9/21	5234;1e+04;13/25	5133;1.2e+04;14/30	5778;1.2e+04;13/27

TABLE II: Part 1 of 2. Events Summary for Brownie from 2021-01-01 to 2021-05-31A summary of most dietary components and events for selected months between 2021-01-01and 2021-05-31. Values have been spot checked but software is still being debugged and accuracy should not be assumed. Format is average daily amount ;maximum; days given/ days in interval . Units are arbitrary except where noted. Any superscripts are defined as follows: **a)** SMVT substrate. Biotin, Pantothenate, Lipoic Acid, and Iodine known to compete..**c)** hamburger with varying fat percentages- 7,10,15,20, etc. ..

Name	2021-01 Jan	2021-02 Feb	2021-03 Mar	2021-04 Apr	2021-05 May
vitaminc(mg)	24;60;8/20	20;60;7/21	15;60;6/25	18;60;8/30	18;60;8/27
zn(mg zn)	8.2;23;10/20	12;23;11/21	10;23;12/25	11;23;14/30	11;23;13/27
MEDICINE					
Ivermectin				0.033;1;1/30	
SnAg		0.14;1;2/21			
panacurc(lbs)			7.2;60;3/25		
swings		0.048;1;1/21			
thgland(capsule)					0.037;1;1/27
thgland(mg)	6.2;44;5/20				
thgland(tsp)	8.20e-03;0.016;9/20	1.25e-03;0.02;1/21	6.25e-04;0.016;1/25		2.31e-03;0.062;1/27
RESULT					
photo	0.1;1;1/20		0.04;1;1/25		
vomit					0.037;1;1/27

TABLE III: Part 2 of 2. Events Summary for Brownie from 2021-01-01 to 2021-05-31A summary of most dietary components and events for selected months between 2021-01-01and 2021-05-31. Values have been spot checked but software is still being debugged and accuracy should not be assumed. Format is average daily amount ;maximum; days given/ days in interval . Units are arbitrary except where noted. Any superscripts are defined as follows: **a)** SMVT substrate. Biotin, Pantothenate, Lipoic Acid, and Iodine known to compete..**c)** hamburger with varying fat percentages- 7,10,15,20, etc. ..

Name	2021-06 June	2021-07 July	2021-08 Aug	2021-09 Sept
FOOD				
KCl(tsp kcl)	0.35;0.25;20/21	0.26;0.25;30/31	0.29;0.25;24/24	0.3;0.25;17/19
KibbleAmJrLmUHP		2.42e-03;0.075;1/31		
KibbleLogic		1.61e-03;0.05;1/31		
b10ngnc ^(c)	1.6;1;13/21	0.71;1;12/31	0.88;1;11/24	0.63;1;6/19
b15ngnc ^(c)		0.065;1;1/31	0.42;1;5/24	0.11;1;1/19
b20ngnc ^(c)	0.24;1;2/21			0.44;1;5/19
b7ngnc ^(c)	0.81;1;7/21	1.2;1;19/31	0.71;1;9/24	0.76;1;7/19
canned				0.053;1;1/19
carrot	1.9;1;20/21	1.9;1;30/31	2;1;24/24	1.9;1;17/19
cbbroth	2.6;1;20/21	1.9;1;30/31	2;1;24/24	2.6;1;18/19
citrate(tsp citrate)	0.35;0.25;20/21	0.26;0.25;30/31	0.29;0.25;24/24	0.3;0.25;17/19
colostrum(tsp)	0.024;0.5;1/21			0.026;0.25;2/19
ctbrothbs	0.095;1;2/21			
eggo3	0.45;0.5;18/21	0.48;0.5;29/31	0.5;0.5;24/24	0.46;0.5;17/19
garlic	0.95;1;9/21	0.75;1;21/31	1.2;1;19/24	1.4;1;17/19
oliveoil(tsp)			0.099;0.25;8/24	0.37;0.5;15/19
salmon		0.1;1;7/31		
shrimp(grams)	18;20;19/21	17;20;28/31	19;20;24/24	17;20;17/19
spinach	1.9;1;20/21	1.9;1;30/31	2;1;24/24	1.9;1;17/19
tuna(oz)				0.015;0.1;3/19
VITAMIN				
B-1(mg)	5.2;40;3/21	12;80;5/31	7.5;100;2/24	21;100;4/19
B-12(mg)	0.12;1;3/21	0.66;1;20/31	0.59;1;14/24	0.48;1;8/19
B-2(mg)	33;50;13/21		17;50;7/24	46;50;14/19
B-3(mg)	60;70;16/21	27;70;13/31	35;70;12/24	30;70;7/19
B-6(mg)	2.4;50;1/21	2;25;3/31	4.2;50;2/24	2.6;50;1/19
B-multi	0.21;0.5;9/21	0.26;0.5;16/31	0.23;0.5;11/24	0.24;0.5;9/19
Cu(mg)	1.1;2.5;9/21	1.1;2.5;13/31	0.94;2.5;9/24	1.1;2.5;8/19
D-3(iu)	238;1000;5/21	452;5000;10/31	167;1000;8/24	221;1000;5/19
Iodine(mg) ^(a)	0.048;0.5;2/21	0.1;0.5;6/31	0.15;0.5;7/24	0.11;1;3/19
K1(mg)	10;10;19/21	8.3;10;26/31	8.8;10;21/24	7.6;10;14/19
K2(mg)	0.71;15;1/21	1.5;15;3/31	1.6;15;3/24	2.7;15;3/19
Mg(mg)	343;400;18/21	355;400;27/31	350;400;21/24	87;400;4/19
Mn(mg)			0.17;2;2/24	0.44;2;4/19
arginine(mg)	929;1500;18/21	1028;1500;21/31	1500;1500;24/24	1243;1500;15/19
biotin(mg) ^(a)	2.9;5;12/21	2.5;5;15/31	2.1;5;10/24	3.9;10;10/19
folate(mg)	0.3;0.5;11/21	0.28;0.5;17/31	0.31;0.5;15/24	0.21;0.5;7/19
histidinehcl(mg)	230;340;11/21	186;340;17/31	255;340;18/24	440;340;15/19
isoleucine(mg)	305;800;8/21	206;800;8/31	194;800;6/24	174;800;4/19
lecithin(mg)	2379;900;20/21	1738;900;30/31	1805;900;24/24	1699;900;17/19
leucine(mg)	619;650;16/21	577;650;23/31	599;650;22/24	599;650;17/19
lipoicacid(mg) ^(a)	6.7;25;6/21	8.7;50;6/31	15;100;6/24	28;50;11/19
lysinehcl(mg)	2368;1950;20/21	1680;1950;29/31	1933;1950;24/24	2739;1950;18/19
methionine(mg)	95;250;8/21	65;250;8/31	135;250;13/24	113;250;9/19
pantothenate(mg) ^(a)	155;250;13/21	122;250;14/31	125;250;12/24	123;250;8/19
phenylalanine(mg)	310;500;13/21	532;5000;24/31	496;500;24/24	460;500;17/19
taurine(mg)	2414;1200;20/21	1735;900;30/31	1805;900;24/24	1723;900;17/19
threonine(mg)	1733;1950;20/21	1355;1950;29/31	1361;1950;24/24	1700;1300;18/19
tryptophan(mg)	424;400;14/21	234;400;19/31	383;400;23/24	237;400;11/19

TABLE IV: Part 1 of 2. Events Summary for Brownie from 2021-06-01 to 2021-09-19A summary of most dietary components and events for selected months between 2021-06-01and 2021-09-19. Values have been spot checked but software is still being debugged and accuracy should not be assumed. Format is average daily amount ;maximum; days given/ days in interval . Units are arbitrary except where noted. Any superscripts are defined as follows: **a)** SMVT substrate. Biotin, Pantothenate, Lipoic Acid, and Iodine known to compete..**c)** hamburger with varying fat percentages- 7,10,15,20, etc. ..

Name	2021-06 June	2021-07 July	2021-08 Aug	2021-09 Sept
tryptophan(tsp)				0.082;0.5;5/19
tyrosine(mg)	400;400;13/21	323;400;25/31	400;400;24/24	605;400;18/19
valine(mg)	610;800;15/21	471;800;18/31	500;800;15/24	537;800;12/19
vitamina(iu)	5143;1.2e+04;9/21	2371;1.2e+04;6/31	1000;1.2e+04;2/24	3474;1.2e+04;6/19
vitaminc(mg)	29;60;9/21	17;60;9/31	15;60;6/24	23;80;7/19
zn(mg zn)	7.8;23;7/21	6.1;23;10/31	7.3;23;9/24	8.6;47;6/19
MEDICINE				
Ivermectin	0.048;1;1/21		0.042;1;1/24	
clavacillin(mg)				237;375;6/19
diroban		0.065;1;2/31		
doxycycline(mg)		106;100;17/31	75;100;10/24	
RESULT				
weight(lbs)				2.6;49;1/19

TABLE V: Part 2 of 2. Events Summary for Brownie from 2021-06-01 to 2021-09-19A summary of most dietary components and events for selected months between 2021-06-01and 2021-09-19.Values have been spot checked but software is still being debugged and accuracy should not be assumed. Format is average daily amount ;maximum; days given/ days in interval . Units are arbitrary except where noted. Any superscripts are defined as follows: **a)** SMVT substrate. Biotin, Pantothenate, Lipoic Acid, and Iodine known to compete..**c)** hamburger with varying fat percentages- 7,10,15,20, etc. ..

2021-01-12	NOTE Brownie arrives today, stray pit bull mix good condition but growling at other dogs. Likes the food.
2021-01-27	NOTE Brownie vet expects puppies after 2 weeks or so. Seem to be moving healthy no skeletons beyond maybe a spine in ultrasound.
2021-02-14	NOTE Brownie no dinner last night thought to be starting labor but still nothing this AM although barking and tail wagging seems hungry and ok. Just gave broth AM which she drank well. Does not appear to have eaten all of kibble Barb apparently gave him last night. First puppy around 0600AM after hearing Brownie barking under deck steps. Pulled her out, walked to bedroom and pool gave birth shortly after. Ate Spicey's snack eagerly but no interest in kibble. One puppy dead around 1600PM- looked in good shape but umbilical cord green/yellow.
2021-02-16	NOTE Brownie seems to have total of 11 puppies, only 1 dead so far. Small one Barb has been putting on nipple seems to be doing ok now.
2021-02-17	NOTE Brownie picky about eating- ate snack AM, refused kibble, ate a few small bowls of canned then stopped. Dripping blood again. Around 0900AM found a dead brown one possibly broken windpipe smaller distended abdomen and red with red umbilical cord fragment. Probably delivered today or yesterday. Total 12 born, 2 dead. She ate more canned food, snubbed the kibble
2021-02-18	NOTE Brownie vet xray no more puppies inside, nothing remarkable although too much milk prescribed pain thing- meloxidyl - and antibiotics for diarrhea. Had lipoic acid but metronidazole dose is quite low
2021-02-19	NOTE Brownie everyone ok she is wagging and looking for food but pool of blood apparently from uterus.
2021-02-21	NOTE Brownie spending more time out of the nest now, laying on floor wanting to come out. Still a bit slow and bleed but wagging and wants to walk, poop solid.
2021-02-22	NOTE Brownie smaller brown puppy crying most of afternoon not eating Barb said Brownie sat on her
2021-02-23	NOTE Brownie the smaller brown puppy died early AM, still warm at 0400AM probably dying most of night. 12 delivered, 1 dead initially, 1 still born day later, 1 at 8-9 days apparent injury. 9 / 12 alive and seem well. Brownie a bit slow and bleeding but wagging and interested.
2021-02-27	NOTE Brownie several puppies appear to have eyes open today, only one yesterday. On track for two weeks. Several can get legs under them and maybe get belly off ground now.
2021-03-01	NOTE Brownie puppies may have eyes open when room light is very dim. May soon be able to escape on top of Brownie, avoid water dish.
2021-03-05	NOTE Brownie puppies seem to like chicken broth and raw b6ngnc on spoon more than the formula we have tried over the past few days. Many seem to recognize the spoon now.
2021-03-07	NOTE Brownie two puppies got out of tub but were just laying on ground, noted the tile is hard hopefully no hurt. another out later, playful developing personality Rosie biting a bit.
2021-03-10	NOTE Brownie everyone out of pool AM then got out again later on their own although maybe crawling on each other. She feeds them out of the pool now. They seem to like kibble in formula with b10ngnc and salmonbroth
2021-03-11	NOTE Brownie puppies seem to like formula with b10ngnc and carrot
2021-03-12	NOTE Brownie got puppies outside today breathing hard but seemed to like it
2021-03-13	NOTE Brownie they seem to be eating the broth soaked kibble now along with b10ngnc and mostly formula. Seem aggressive but generally playful although biting and pulling a bit .
2021-03-14	NOTE Brownie seems to be breathing harder while resting although still runs and barks outside etc. Added small amount of garlic
2021-03-15	NOTE Brownie puppies ate two plates of 2 small kibble scoops soaked in chicken broth small amount of AMSNACK and b7ngnc with 1.5 tsp formula. Chloe or big one threw up white paste Barb says looks like pee pad absorbent remove pads, not eating at noon. 3rd plate similar at noon include .25x1620 shrimp
2021-03-16	NOTE Brownie despite thunder storms everyone seems happy outside now. Chloe recovered from the presumed pee-pad vomit after forced bottle feeding and everyone seems back to normal. Seems to like table over bed.
2021-03-25	NOTE Brownie not bleeding much if at all now. Some spots but few.
2021-03-27	NOTE Brownie.puppies vaccines pyrantel distemper adenovirus type 2 parainfluenza parvovirus SOLO-JEC 5

2021-04-01	NOTE Brownie growling at excessive nursing, must be ready to wean. Combined weight last weekend was something like 9 time 7-9 or maybe 72 pounds.
2021-04-02	NOTE Brownie growling more but still nursing
2021-04-03	NOTE Brownie growling refusing almost all nursing AM. Coughing spit up some white foam after running from puppies and back.
2021-04-07	NOTE Brownie only nursing briefly now, more growling.
2021-04-07	NOTE Brownie.puppies no poop in pen, won't eat in pen maybe toilet trained themselves. Eat almost only outside of pen.
2021-04-09	NOTE Brownie apparently threw up evening meal for puppies who probably got the lipoicacid and garlic.
2021-04-11	NOTE Brownie.puppies vaccine and pyrantel, 5 and KC Bordetella etc. Chloe(14. lbs), Rosie(11.8 lbs), black thin stripe, Possible Walker thick white sripe, Brindle, Brown (13 lbs) , Brindle 2, Panther black brindle paws, Brindelle 3 estimate 13*9=117 lbs
2021-04-12	NOTE Brownie.puppies had to separate brown one from Rosie as she kept crying not sure how bad it was but even Brownie had to see what was going on. They all ignored the cat outside the fence that looked like a puppie
2021-04-15	NOTE Brownie still nursing sometimes. Sore on rear leg bleeds sometimes, consider oil
2021-04-15	NOTE Brownie.puppies borwn one and one other attacked Rosie again after carrots
2021-04-16	NOTE Brownie.puppies Rosie leaving before evening snack, calculated reduced weigtght from 117 lbs
2021-04-17	NOTE Brownie.puppies black one with no white on tail tip vomiting a lot- first rubber that looks like pipe insulation then wads of grass with roots. Ate PMSNACK ok but then coughing later as if something in lungs.
2021-04-19	NOTE Brownie bleeding sore on rear leg healed, suspect garlic etc
2021-04-23	NOTE Brownie.puppies many coughing or hacking around 0500AM
2021-04-23	NOTE Brownie.puppies ok once out of pen, one of the Walker's right eye is still squinting and teering may be swollen. Chloie and one other maybe Walker on short walk around yard with Brownie in Happy collar
2021-04-24	NOTE Brownie.puppies giving AMSNACK to smaller brindle who seems a little dettached, vaccines and pyrantel Deanna seems to think they are healthy and maybe big
2021-04-27	NOTE Brownie.puppies Walker and Fudge (male, both brindle Fudge looks like a tiger almos) got Triworm for hookworm (heart shaped, bottle not specific Barb called it Triworm)
2021-04-27	NOTE Brownie.puppies leaving Wed evening supposed to go to vet today.
2021-04-28	NOTE Brownie.puppies Fudge, tiger brindle , Walker, big brindle big stripe, Biscuit, bigger black one with white tale tip and big white stripe and cough, left 2300PM
2021-04-28	NOTE Beauty went on walk yesterday for first time in a while. Eating a lot of grass but so were Brownie and Happy and Claire.
2021-04-30	NOTE Brownie.puppies now have 5, the brindle Walker, brown one, gold bindle similar to Fudge, smaller black panter similar to Biscuit, and Chloe. Rosie came over PM has .125 AMSNACK and .06 PMSNACK . Brown puppy attacked her but played well with Brownie, had vaccine and pyrantel. Seems ok but smaller than the others.
2021-05-04	NOTE Brownie.puppies actually ate snack early next morning but don't have a way to handle that doh
2021-05-07	NOTE Brownie.puppies gave Walker2 2mg Cu and garlic in hope of clearing up right eye.
2021-05-09	NOTE Brownie.puppies Walker2 had 2mg Cu in garlic chicken hopefully for right eye which is still bothering him.
2021-05-16	NOTE Beaity got a copy of Brownie snack as Hinley was not eating much
2021-05-24	NOTE Brownie.puppies something wrong with Walker2 eyelid this was probably the day of health critificate for him and panther but not given meds until 26th
2021-05-25	NOTE Brownie likely vomit on deck and probably Sera too
2021-05-25	NOTE Sera likely vomit on couch and probably Brownie too
2021-05-25	NOTE Brownie.puppies Cupcake and Walker still at vet, only gave brown and brindle half the snack which they ate well. Walker (pudding) 28.1 lbs weight and Panther (cupcake) 24.4 lbs
2021-05-25	NOTE Brownie.puppies taking to vet for spay neuter only two will eat AM Pudding and Cupcake, black and walkwe2 , to vet. Note also Chloe had some small eyeleid extension on one eye. Both ate well around 1545PM when brought back from vet, little sleepy but almost completely awake. Apparently Pudding to tobramycin and autologous serum drops.
2021-05-26	NOTE Brownie.puppies Walker2 0930AM tobramycin and serum first sense prescribed two days agao . Again around 1500PM . Transport 1530PM
2021-05-26	NOTE Brownie.puppies probably Walker2 diagnosed with Entropion eyelid although holding eye shut and teering again, has not had the tobramycin in a while now supposed to transport at 3:30 PM today.
2021-05-27	NOTE Brownie.puppies only two left now about 50 lbs total est.
2021-05-31	NOTE Brownie.puppies Cupcake renamed Maggie

2021-06-03	NOTE Brownie_puppies to vet for spay neuter etc
2021-06-10	NOTE Brownie_puppies left in van yesterday around 1530PM. Brindle did not seem to want to go but Brownone did not care. Went in same cage. Glad we could walk before the rain which got very heavy right after they left although no rain while loading.
2021-06-18	NOTE Brownie bleeding
2021-07-11	NOTE Brownie accidentally had Beauty PMSNACK
2021-07-13	NOTE Brownie to vet for heartworm treatment today
2021-07-17	NOTE Beauty accidentally gave her snack to Brownie but she is eating normally
2021-07-29	NOTE Brownie coughed once again, coughed a day or two ago too
2021-07-31	NOTE Vader aka Corkie took Spicey SAMSNACK off of counter while I was feeding Brownie and Hinley...
2021-08-21	NOTE Brownie on walk yesterday definitely even more energy jumping etc.
2021-09-13	NOTE Brownie to spayed, sleepy when back, est age 7.5 years
2021-09-14	NOTE Brownie ER last night bloat may be ok. Drained fluid, ate ok in AM
2021-09-16	NOTE Brownie seems normal but slow now. Abdomen seems normal. Second hand info draining fluid untwisted GI tract and bloat resolved sequence of events unclear but abdomen was distended when i took her out of van on return from vet's

Appendix B: Statement of Conflicts

No specific funding was used in this effort and there are no relationships with others that could create a conflict of interest. I would like to develop these ideas further and have obvious bias towards making them appear successful.

Appendix C: About the Authors and Facility

This work was performed at a dog rescue run by Barbara Cade and housed in rural Georgia. The author of this report ,Mike Marchywka, has a background in electrical engineering and has done extensive research using free online literature sources. I hope to find additional people interested in critically examining the results and verify that they can be reproduced effectively to treat other dogs.

Appendix D: Symbols, Abbreviations and Colloquialisms

TERM	definition and meaning
BCAA	Branched Chain Amino Acid
MUQED	Multi-Use Quantitative Even Diary
SMVT	Sodium dependent Multi-Vitamin Transporter

Appendix E: General caveats and disclaimer

This document was created in the hope it will be interesting to someone including me by providing information about some topic that may include personal experience or a literature review or description of a speculative theory or idea. There is no assurance that the content of this work will be useful for any particular purpose.

All statements in this document were true to the best of my knowledge at the time they were made and every attempt is made to assure they are not misleading or confusing. However, information provided by others and observations that can be manipulated by unknown causes may be misleading. Any use of this information should be preceded by validation including replication where feasible. Errors may enter into the final work at every step from conception and research to final editing.

Documents labelled "NOTES" or "not public" contain substantial informal or speculative content that may be terse and poorly edited or even sarcastic or profane. Documents labelled as "public" have generally been edited to be more coherent but probably have not been reviewed or proof read.

Generally non-public documents are labelled as such to avoid confusion and embarrassment and should be read with that understanding. ‘

Appendix F: Citing this as a tech report or white paper

Note: This is mostly manually entered and not assured to be error free.

This is tech report MJM-2021-003.

Version	Date	Comments
0.01	2021-05-06	Create from empty.tex template
0.50	2021-09-29	Draft with most info and software spot checked
-	September 29, 2021	version 0.50 MJM-2021-003
1.0	20xx-xx-xx	First revision for distribution

Released versions,
build script needs to include empty releases.tex

Version	Date	URL
0.50	2021-09-29	https://www.researchgate.net/publication/354924460_Supplement_Usage_Including_Vitamin_K_by_a_Heartworm_Positive_Pregnant_Pit_Bull_and_Her_Puppies
0.50	2021-09-29	https://www.academia.edu/s/58c5377737
0.50	2021-09-29	https://www.linkedin.com/posts/marchywka_uneventful-story-of-brownie-heartwormpregnant-activity-6848

```
@TECHREPORT{mmarchywka-MJM-2021-003-v0.50 ,
AUTHOR = {M.J. Marchywka},
TITLE = { Supplement Usage Including Vitamin K by a Heartworm Positive Pregnant Pit Bull and Her Puppies},
NUMBER = {MJM-2021-003},
VERSION = {0.50 September 29, 2021 PUBLIC NOTES },
INSTITUTION = { not institutionalized , independent},
ADDRESS = {306 Charles Cox , Canton GA 30115},
NOTE = {Version 0.50 , may change significantly if less than 1.00 },
DATE = {September 29, 2021},
DAY = {06},
MONTH = {05},
YEAR = {2021},
AUTHOR1EMAIL = {marchywka@hotmail.com},
AUTHOR1ID = {orcid.org/0000-0001-9237-455X},
PAGES = { 17 },
CONTACT = {marchywka@hotmail.com},
FILENAME = {brownie}
}
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Supporting files. Note that some dates,sizes, and md5's will change as this is rebuilt.

This really needs to include the data analysis code but right now it is auto generated picking up things from prior build in many cases

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1190 Sep 29 10:15 brownie.blg 67c3eb2734745670b52fe7daf3eb5d7b
326 Sep 29 10:15 ./brownie.bundle_checksums 79e9d95958b7053f2d55b518edef0a9e
3 Sep 29 10:15 ./brownie.last_page 4d095eeac8ed659b1ce69dcef32ed0dc
59467 Sep 29 10:15 brownie.log acfcff1ebbbfadce40aa7db939e3d379
975 Sep 29 10:15 ./brownie.out 8ac7be73142941df207be876baea3b0d
30644 Sep 29 10:08 ./brownie.tex c40bcb2c56bca745b3e8529bfb4d4b0e
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3364 Sep 29 10:15 ./comment.cut eacbef04188c1d77ee27a9c454e42ca4
19400 Aug 22 09:15 /home/documents/latex/bib/mjm_tr.bib 4cef853e3d35743d50cab1283ac0c49f
14530 Sep 29 10:11 /home/documents/latex/bib/releases.bib 051816aed3014e6775ed450632ba2462
7331 Jan 24 2019 /home/documents/latex/pkg/fltpage.sty 73b3a2493ca297ef0d59d6c1b921684b
7434 Oct 21 1999 /home/documents/latex/pkg/lgrind.sty ea74beead1aa2b711ec2669ba60562c3
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2474526 Sep 29 10:15 brownie.pdf d7631bfefec70b5b6a85afb81443e704