


 LKS Faculty of Medicine
 Centre for Comparative
 Medicine Research
 香港大學比較醫學研究中心

Enrichment Program for Laboratory Animals

Updated: September 2022

1

General Policy Guideline

As a minimum requirement, all laboratory animals must be provided at least one enrichment item that is appropriate for the species, strain and/or condition of the animal (as outlined in this document).

Additional enrichment items are encouraged to be provided dependent on the cage condition (such as additional nesting material for breeding animals, paper house for fighting animals, or gel diets for post-operative animals).

All singly housed animals must receive at least two (or more) enrichment items that are appropriate for the species, strain and/or condition of the animal.

2

Wooden Wool

- Made of pure aspen.
- The soft strips of wood are ideal for nest building and cage enrichment for mice and rats.

Current practice in CCMR:

- All Areas:**
 - Rats and mice: All strains
- *Not suitable for animals with circling phenotype or ocular lesion/ symptom.*
- Frequency:**
 - Daily
- Manufacturer(s)/Local Agent(s):**
 - Tapvei/ Totoro Supplies



PM90L/2R

5 mm x 20 mm

For mice and Rats

3

Enviro-Dri®

- Made of cleanly cut (1/8-inch) and crinkled paper strips (50% recycled paper and 50% virgin kraft paper fibers), Enviro-Dri® provides a dust-free and economical form of enrichment. Respiratory ailments and other problems resulting from competing compressed cotton squares are eliminated by using Enviro-dri®.
- Enviro-Dri® forms a soft, springy, comfortable mat ideal for bedding and nesting. Its absorption capacity maintains dryness for added animal comfort.

Current practice in CCMR:

- All Areas:**
 - Backup for Wooden Wool
 - Rats and mice: All strains
- *Not suitable for animals with circling phenotype or ocular lesion/ symptom.*
- Frequency:**
 - Daily
- Manufacturer(s)/Local Agent(s):**
 - Lillico Biotech / Keymax




4

Corn Husk

- Works similarly as Enviro-Dri® to provide nesting material for the animal.
- Made mainly from dry fibers and cellulose, it has less absorption capacity than the Enviro-Dri®.
- Used as a food supplement for rabbit during sickness or post-operative recovery period.

Current practice in CCMR :

- CA-Ext:**
 - Mice & Rats: Experimental holding animals.
 - *Not suitable for Nude mice*
- CA-FMB:**
 - Rabbits: For post-operation/sick animals.
- Frequency:**
 - Daily
- Manufacturer(s)/Local Agent(s):**
 - Wong Ying Kee



5

Nestlet®

- Provides a nesting material addition to standard bedding. Encourages rodents' natural instinct to shred material for nesting building, adding extra interest and beneficial exercise.
- The material in Nestlet® retains warmth without obstructing airflow, it is inert, will not compact or form threads and its composition is non-dessicative nor will it cause irritation to newborn rodents.

Current practice in CCMR :

Apply together with Enviro-Dri® when necessary

- SPFBA:**
 - SCID Beige & SCID breeder mice
- CA and MDA:**
 - Apply to the challenging breeders, special immunodeficient strains and use for some transgenic mice (with phenotype of circling/blind).
- *Not suitable for use in nude mice because of conjunctivitis problem*
- Frequency:**
 - Daily
- Manufacturer(s)/Local Agent(s):**
 - Ancare Corporation




6

Mouse Igloo/Arch, Tunnel and Plastic Red House

- Provides security, entertainment and a nesting shelter.
- Its holes allow ready access by mice but still retain the feeling of security.
- It helps reduce boredom and aggressive behaviors.
- All products are available in transparent red and amber. These products are easy to handle and are made from durable, non-toxic polycarbonate (tinted). They are also easy to clean and reuse.
- Plastic Red House also extends the floor area.

Current practice in CCMR :

•All Areas:

•Mice:

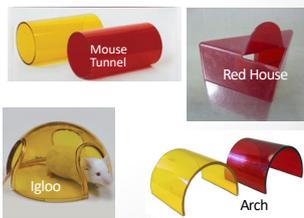
- Apply together with Enviro-Dri® when necessary (e.g. if sign of barbering / fighting noted or singly-housed animal.)
- Used for SCID Beige & SCID stock animals in SPFBA

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Lillico Biotech / Keymax
- Bio-Serv
- Datesand



7

Safe Harbor®

- A shelter for mice that offers life-saving refuge during cage flooding events by providing an opportunity for escape to a higher level where mice can stay warm and dry.
- The bi-level design offers a platform for undersized weanlings to reach the food source on cage lids, as well as a means for submissive mice to find shelter and easily move away from dominant mice, thereby minimizing fighting injuries as compared to other shelters that trap the mice inside.

Current practice in CCMR :

Apply together with Enviro-Dri® when necessary

•SPFBA:

- Used also as a platform to hold the DietGel® Boost in nude mice.

•MDA and CA:

- For those mice with eye problem in which paper house cannot be used.

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



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Des. Res.™ and Dome Home (Paper house)

- The Des. Res.™ and Dome home (paper house) work similarly as the mouse igloo/plastic red house.
- Increase the surface area in the cage and provide a refuge for nesting and stimulate activity.
- Improve breeding performance of particularly sensitive and fragile strains of mice.
- Available in different sizes, light to handle and easy to be disposed of.

Current practice in CCMR :

•All Areas:

•Rats and mice:

- Apply together with Enviro-Dri® when necessary (e.g. pregnant mother and sign of barbering / fighting noted or singly-housed animal.)
- MDA uses the Des. Res.™ to replace the igloo/arch or Enviro-Dri® in those mice that have the circling phenotype.

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Datesand
- Lillico biotech (through Keymax)
- Bio-Serv



9

Rat Retreat™(Plastic Tunnel)

- Allows for sheltering and gnawing;
- Flat top increases floor space and large flat sides prevent rolling..

Current practice in CCMR :

•SPFBA, MDA & CA:

•Rats:

- Apply if sign of barbering / fighting noted or singly-housed animal

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



10

Hut (Plastic Tunnel)

- Provides a comfortable resting place for the animal. The tint diffuses light providing a sense of security.
- The octagonal shape prevents rolling; the open ends offer ventilation and the open base allows faeces and urine to be absorbed by the bedding.

Current practice in CCMR :

•SPFBA & CA:

•Rats:

- Apply if sign of barbering / fighting noted or singly-housed animal

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



11

Rest Stop™

- Offers paw relief from wire-bottom floors and provides a comfortable resting area;
- Useful for placing special diets or enrichment treat at cage level

Current practice in CCMR :

•SPFBA:

•Rats:

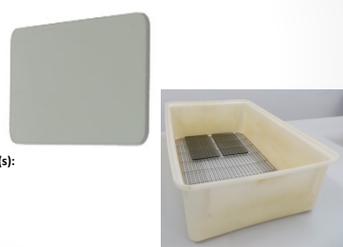
- Hand-mating animals

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



12

Sunflower Seed

- Provides additional activity, and source of fatty acids and amino acids for laboratory animals. Anecdotal evidence has indicated that the prudent use of sunflower seeds in difficult breeding mice can improve litter size and survivability.
- Irradiated seeds should be used. Seeds should not be autoclaved since autoclaving heats off the oils that are most valuable for the animals.
- Adds to feeders sparingly to avoid creating a dietary imbalance.

Current practice in CCMR :

- SPFBA:**
- Mice: Breeders for CBA, SCID, SCID Beige mice; Future breeders for CBA and nude mice
- CA and MDA:**
- Breeders for NOD SCID, NSG mice & colonies with poor breeding performance

•Frequency:

- TWICE per week (Except public holidays)

•Manufacturer(s)/Local Agent(s):

- PMI LabDiet® /Totoro Supplies

•Shell life: 12 months, cool dry storage



Nutritional Profile			
Protein	16.0%	Ash	3.5%
Fat	23.0%	Calcium	0.05-0.55%
Fiber	35.0%	Phosphorus	>0.3%
		Sodium	<0.1%

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Aspen Block

- Tough to chew and gnaw. Help animals to satisfy their natural instincts and exercise teeth/gums for promotion of dental health.
- Freshly cut from virgin wood. They are available in a variety of sizes.

Current practice in CCMR :

- All Areas:**
- Rats and mice

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Tapvei/ Totoro Supplies



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Nylon Bone

- Made from 100% non-toxic materials (no nutritional value to interfere with studies).
- Helps animals satisfy natural chewing instincts in a safe and healthy way.
- Also helps reduce malocclusions and prevent stereotypical behavior.
- The green colour provides better visibility in bedding.

Current practice in CCMR:

- All areas:**
- Rats

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-serv



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Diet Gel Products

- DietGel® can be provided as a food supplement.
- ClearH:O® offers barrier packed hydration, nutrition, enrichment and medication delivery products that enhance the wellness and survival of research animals.
- DietGel® are the soft diet for compromised or special needs animals.

Current practice in CCMR:

- All Areas:**
- Rats, mice, guinea-pigs and rabbits: Supply when necessary (e.g. Underweight, post-surgical operation, inappetence, poor breeding performance, weak and impaired animals)

•SPFBA:

- DietGel Boost

•MDA:

- DietGel Boost, Recovery and 76A

•CA:

- DietGel Recovery and 76A

•Manufacturer(s)/Local Agent(s):

- EPS (China) Co. Ltd



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Diet Gel Products

		DietGel® Recovery is a nutrient fortified water gel that aids in the recovery of post-surgical, weak or impaired rodents. Proven to increase survival rates in compromised animals. Ingredients Purified Water, Corn syrup, Hydrocolloids, Vegetable Oil, Calcium Caseinate, Electrolyte Mix, Food Acid, Mineral Mix
		DietGel® 76A is a nutritionally complete soft diet, combining hydration and nutrition in a single serving. It is flavor enhanced resulting in increased consumption. Ingredients Purified Water, Molasses, Corn Syrup, Calcium Caseinate, Vegetable Oil, Phosphoric Acid, AIN Mineral Mix, Hydrocolloids, Cellulose, AIN Vitamin Mix, Benzoic Acid, Sorbic Acid
		DietGel® Boost is a high-calorie supplement that provides energy for weanlings, post surgical, debilitated and aging animals. Ingredients Pumpkin, Vegetable Oils, Molasses, Purified Water, Corn Starch, Vitamin Mix, Sunflower Lecithin, Food Acids, Hydrocolloids

(1) **•Shell life:** 12 months (except for Hydrogel which has 18 months shelf life)

(2) **•Storage:** Does not require refrigeration or special handling for UN-OPENED package. Once opened, remaining contents should be refrigerated in a sealed package and used within 5 days.

www.clearh2o.com

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Supreme Mini-treat™

- Supreme Mini-treat™ is a nutritionally complete treat.
- It is used for training, conditioning or as a reward following a less desirable procedure.
- The appetizing aroma of the treat also helps to deter rodent maternal cannibalism; chocolate and very berry flavor recommended. It is also an excellent source of Vitamin C.

Current practice in CCMR:

- CA:**
- Rats and mice : For post-operative or inappetent animals when necessary
- Rabbits: For post-operative or inappetent animals and Positive reinforcement before/while wearing Elizabethan collar

•Manufacturer(s)/Local Agent(s):

- Bio-Serv

•Shell life: 12 months, cool dry storage



Nutritional Profile			
Protein	19.7%	Ash	5.2%
Fat	6.1%	Moisture	<10%
Fiber	11.3%	Carbohydrate	53.0%

Vitamin C: 1.1 mg/Pellet
Vitamin D: 2.0 mg/Pellet
Calories: 4.48 kcal/gm

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Raw Peanut

- Animals will stay busy peeling away the shell to get to the nut.

Current practice in CCMR:

•CA:

- Rats:
For post-operative and inappetent animals when necessary

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



Nutritional Profile:			
Protein	25.2%	Ash	2.6%
Fat	48.8%	Moisture	<10%
Fiber	8.5%	Carbohydrate	8.0%
Calories: 5.72 kcal/gm			

Shell Life: 12 months, refrigerated

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Papaya Tablet

- Papaya tablets can be provided as a feed supplement.
- Papaya Tablets contain papaya, melon and the proteolytic enzyme papain, which may aid in alleviating symptoms of gastrointestinal disorders.
- Irradiated papaya tablets available.

Current practice in CCMR:

All Areas:

- Rabbits (>7 weeks old)

•Frequency:

- 1 tablet daily – Monday to Saturday (Except public holidays);
- Post-operation/sick animals – 1 tablet daily (included public holiday)

Except for anorexic rabbits

•Manufacturer(s)/Local Agent(s):

- PMI LabDiet® / Totoro Supplies



Shell Life: 12 months, cool dry storage

20

Dumbbell

- These sturdy, lightweight dumbbells are made of long lasting, solid, non-toxic polypropylene. They provide interest and enjoyment to a variety of animals.
- The large end knobs minimize loss through cage bars. Dumbbells are available in a variety of size and colours.

Current practice in CCMR:

•SPFBA and CA:

- Rabbits:
Use alternately with Jingle Balls in all cages.
- Ferrets:
Use alternately with Nobbly Wobbly® in Conventional Holding Area.

•Frequency:

- Daily
- Remove from the cage during post-operative recovery period
- Remove from the cage if animal has superficial lesion(s).



•Manufacturer(s)/Local Agent(s):

- Bio-Serv

21

Jingle Ball

- The 100% polyethylene Jingle Ball is designed with holes and also contains a stainless steel noise-maker.
- The Jingle Ball supplies a safe, sanitisable object to help prevent boredom and promote psychological well-being. The ball satisfies their nudging, rolling and chewing instincts.

Current practice in CCMR:

•SPFBA and CA:

- Rabbits:
Use alternately with dumbbells in all cages.

•Frequency:

- Daily
- Remove from the cage during post-op recovery period
- Remove from the cage if animal has superficial lesion(s).



•Manufacturer(s)/Local Agent(s):

- Bio-Serv

22

Stainless Steel / Plastic Tunnel

- Provide security and entertainment shelter.
- Help reduce boredom and aggressive behaviors.
- Easy to handle. Made from non-toxic polycarbonate (tinted) or durable plastic. Easy to clean and reuse.

Current practice in CCMR:

•CA:

- Ferret:
Used in both conventional holding and IVC cages

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



23

Cyclone Chew

- The Cyclone Chew is made of durable polyurethane. The nubby texture prevents tartar build up and provides gnawing enrichment for the ferrets.

Current practice in CCMR:

•CA:

- Ferrets:
Trial run started in Nov-2017

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



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Nobbly Wobbly®

- The Nobbly Wobbly® is made of flexible rubber. The colorful interwoven ball increase interest and encourages exercise at play.

Current practice in CCMR:

•CA:

- Ferrets:
- Use alternately with Nobbly Wobbly® / Dumbbell® in Conventional Holding Area.
- Trial run started in Nov-2017

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



25

Bamboo Plant

- The Bamboo Plant is made of flexible, soft PVC. It mimics vegetation in native habitat and gives fish a place to explore.

Current practice in CCMR:

•Core Facility:

- Zebrafish:
- Trial run started in Nov-2017.

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Bio-Serv



26

Timothy Hay

- Autoclaved hay can be provided as a food supplement.

Current practice in CCMR:

•SPFBA & CA:

- Guinea-pigs and Rabbits

•CA:

- Goats and Rabbits

•Frequency:

- Guinea-pig:
 - Daily
- Rabbits:
 - Daily
- Goat:
 - Quarantine period – First two weeks upon arrival;
 - Post-operation/sick animals – Daily

•Manufacturer(s)/Local Agent(s):

- Totoro Supplies



[Shelf Life: 3 months after autoclaved, cool dry storage](#)

27

Stainless Steel Wire Ball

- Rabbits can be playful and a variety of environmental enrichment items can be used.
- They seem to enjoy objects that they can nudge and toss around their cage, the hanging chains with stainless steel wire ball can serve this purpose.

Current practice in CCMR:

•SPFBA and CA:

- Rabbits

•Frequency:

SPFBA and CA:

- Apply in the cage daily (Timothy Hay will be put inside the wire ball)

CA:

- Remove stainless steel ball and place Timothy Hay on the cage floor during post-operative recovery period or if animal has superficial lesion(s).

•Manufacturer(s)/Local Agent(s):

- Hing Lung



28

Noryl Perforated Raised Shelf

- Raised shelf for animal to rest on or hide within the cage.

Current practice in CCMR:

•SPFBA and CA:

- Rabbits:
- Apply in all cages (both Tecniplast plastic cages and NKP metal cages).

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Tecniplast / Keymax



29

Noryl Perforated Raised Shelf with Ramp

- Raised shelf for animal to rest on or hide within the cage.
- It creates a three-dimensional enriched environment.

Current practice in CCMR:

•SPFBA and CA:

- Guinea Pigs:
- Apply in all cages

•Frequency:

- Daily

•Manufacturer(s)/Local Agent(s):

- Tecniplast / Keymax



30

Music

- Music is considered to be one of the sensory enrichments in the laboratory animals.
- Constant background noise during daytime (e.g. ≤ 85 -dB volume radio music) has benefits in facilitating breeding and decreases the excitability of animals by reducing the startle effect of sudden noises.

Current practice in CCMR:
•SPFBA and CA:
 - Rabbits, guinea-pigs and chickens

•Frequency:
 - Daily from 9:00am to 5:00pm.
 - Music pieces (Weekly rotation)



31

Nutri-Cal® and Bio-lapis®

- Nutri-Cal® is a high calorie dietary supplement in a paste form. It is intended for animals that require extra calories and vitamins in the diet.
- Bio-Lapis® is a dandelion flavoured powder which contains electrolytes, vitamins, probiotics and preplex prebiotics. It is intended to replenish losses due to dehydration and stimulate the growth of beneficial bacteria in the intestine.

Current practice in CCMR:
•SPFBA and CA:
 - Rabbits
 For post-operation/sick animals when necessary

•Manufacturer(s)/Local Agent(s):
 - Maxipro (Asia) Ltd (Bio-lapis) and Totoro Supplies (Nutri-Cal)



[Sheff Life:](#) As stated on the package, cool dry storage

32

Critical Care®

- Critical Care® is a recovery food which can be given to herbivores that are unwilling to eat their normal diet due to illness, surgery or poor nutritional status.
- This product contains all the essential nutrients of a complete diet as well as high-fiber timothy hay to ensure proper gut physiology and digestion.

Current practice in CCMR:
•SPFBA and CA:
 - Rabbits:
 For post-operation/sick animals when necessary

•Manufacturer(s)/Local Agent(s):
 - Totoro Supplies



Nutritional Profile:			
Protein	16.0%	Ash	10.0%
Fat	3.0%	Moisture (max)	10%
Fiber	21.0-26.0%		
Calories: 24 kcal/Absp.			

[Sheff Life:](#) Prepare fresh at each feeding; discard after 24 hours. Store in a cool, dry place.

33

Critter Be Better® Supplement

- Critter Be Better® supplement can be provided as a food supplement if the rabbit refuses to eat Timothy Hay.
- It is a formulation of a complete American Pet Diner Timmy based pellet ration and a superior mix of direct fed microbials to improve the microflora and digestion system.

Current practice in CCMR:
•CA:
 - Rabbits:
 For post-operation/sick animals when necessary

•Frequency:
 Daily until recovery (if the animal refuses to eat Timothy Hay)

•Manufacturer(s)/Local Agent(s):
 - American Pet Diner Timmy / Totoro Supplies



Nutritional Profile:			
Protein	>15.0%	Ash	<12.00%
Fat	>3.0%	Calcium	0.5-0.8%
Fiber	18.0-25%		

[Sheff Life:](#) As stated on the package, cool dry storage

34

Polyethylene (Big red) Apple

- The polyethylene apple allows expression of highly motivated oral activities that would otherwise be directed toward pen-mates and pen fixtures.
- Increases the environmental complexity of stall animals' environment to reduce boredom and distress.

Current practice in CCMR:
•CA:
 - Goats and Pigs

•Frequency:
 - Daily

•Manufacturer(s)/Local Agent(s):
 - Bio-Serv



35

Cement Block

- Acts as an environmental enrichment for the goat to step on.

Current practice in CCMR:
•CA:
 - Goats

•Frequency:
 - Daily

•Manufacturer(s)/Local Agent(s):
 - Hand-made (in-house)



36

Chain/Rattle

- Stainless steel welded link chain/rattle.
- Hang in pens to encourage play behavior.

Current practice in CCMR:

•CA:
-Goats and Pigs

•Frequency:
- Daily

•Manufacturer(s)/Local Agent(s):
- Lillico biotech / Keymax
- Bio-Serv



37

Best Ball

- High impact resistant Best Balls are made from tough, non-toxic polyethylene. The 252mm diameter ball has a recessed screw that allows it to be loaded with water, sand or gravel to alter the way it rolls and sounds.
- Pigs enjoy the stimulation of playing with a Best Ball.

Current practice in CCMR:

•CA:
- Pigs

•Frequency:
- Daily

•Manufacturer(s)/Local Agent(s):
- Bio-Serv



38

Ultimate Turf Swine Scratcher

- Made of high density polyethylene (HDPE) and provides opportunity for the pigs to soothe itchy skin.

Current practice in L.A.U.:

•CA:
- Pigs:
Daily (except for the animal(s) that have just undergone an operation)

•Manufacturer(s)/Local Agent(s):
- Bio-Serv



39

Fresh Fruits and Canned Pet food

- Fresh fruits and/or canned pet food can be provided as a food supplement for pigs.

Current practice in CCMR:

•CA:
- Pigs:
Supply when necessary (e.g. inappetence)

•Manufacturer(s)/Local Agent(s):
- Supermarket and pet shops




Nutritional Profile			
Protein	44.0%	Carbohydrate	13.2%
Fat	33.2%	Crude Fiber	0.4%
Calories: 193kcal/156g can			
Vitamin C: 231 ppm			
Vitamin E: 668 IU/kg			
Shelf life: As stated on the can, cool dry storage			

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Perch

A rod or branch serving as a roost for birds. Perching also provides welfare benefits such as increased leg bone strength, reduced aggression and improved foot and plumage condition.

Current practice in CCMR:

•CA:
-Chicken:
Hardwood with flat/round top, installed in all cages when the chickens are ≥14-days-old.

•Frequency:
- Daily

•Manufacturer(s)/Local Agent(s):
- Hand-made (in-house)



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Acknowledgement

Information mentioned in the slides can be obtained from the following sources/websites:

- Bio-Serv® (<https://www.bio-serv.com/>)
- ClearH2O (<https://clearh2o.com/>)
- Keymax Technology (Hong Kong) Ltd
- Lillico Biotech (<http://www.lillicobiotech.co.uk/>)
- Maxipro (Asia) Limited (<http://www.maxipro-asia.com/animalHealth/en/index.php>)
- PMI LabDiet International (<https://www.lshdiet.com/>)
- Tapvei® (<http://www.tapvei.com/>)
- Totoro Supplies (<http://www.totoro.com.hk/top.htm>)

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