



Marijuana Lab Testing

First Edition

Investing in one of
the industry's most
attractive plays

An In-depth Analysis

June 2015

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EXECUTIVE SUMMARY

The proliferation and diversity of the various state legalized marijuana markets have spawned numerous and different ancillary enterprises that are eagerly seeking a permanent foothold in the evolving cannabis eco-system. As individual states debate the efficacy of current legislative statutes or contemplate initial legalization referendums, lab testing requirements of cannabis products has become an increasing subject of concern and attention. Although the current governing statutes regarding legalized marijuana uses vary in great degrees from state to state, one common theme that has emerged is the increased awareness on the part of legislators and health officials, as well as cultivators and laboratories, of the critical importance of product testing and quality assurance.

With an eye forward to eventual federal rescheduling or possible de-listing it is reasonable to assume that uniform national testing and operational standardization protocols could eventually be implemented at least as a baseline binding thread that will steadfastly assure consumers of an expectant consistency of product. Lab testing services therefore, appears to us as a prime target for investment capital aimed at securing a durable enterprise presence in the evolving cannabis industry.

In this report, we endeavor to provide investors with a quantitative overview of the marijuana lab testing sector with a first glimpse as to what the potential market size could approach by the year 2020. In this regard, we build upon the conclusions drawn from our prior research efforts and accordingly, we believe that investment in these businesses will become increasingly more attractive for a number of reasons:

- By the year 2020, assuming full legalization, lab testing and related service revenues could approximate \$850 million (based upon our U.S. marijuana retail revenues forecast).
- Cannabis testing labs appear to be highly scalable with opportunity for significant margin expansion, as other ancillary high margin businesses such as data analytics and consulting will augment the mix of revenues. Operating leverage should translate to attractive Free Cash Flow yields abetted by recurring revenue streams.
- With many players currently jockeying for position and new entrants appearing as each state moves forward with legalization, the lab testing market will become increasingly saturated. Profitability and survival will depend upon technical prowess and adequate capitalization.
- The lab businesses that are best positioned to expand market share beyond their initial geographic confines into additional states or regions will provide the most compelling opportunities for investors seeking the prospect of long term growth or other exit strategies such as eventual absorption by established larger cap suitors.
- We note that recent moves in New York (regulations require the DEA to license labs) and Colorado (EPA takes interest in establishing a cannabis crop category for pesticides) could signal that there is an increasing acceptance of the inevitability of rescheduling or delisting and that comprehensive federal oversight will quickly follow. Such eventual oversight will present new technical and financial challenges to succeeding laboratory ventures.

CURRENT STATE REQUIREMENTS

The current snapshot is fragmented as states grapple with local sentiments and politics. Consequently, there is little consistency among jurisdictions with the requirements for defined protocols for testing product before it reaches the consumer. There are wide differences between state regulations, ranging from little to no oversight, to what some consider as overly restrictive requirements. Additionally, unless and until clear federal guidelines are in place, individual states are also left to decide upon the accreditation standards for the laboratories themselves.

To help investors gain a better understanding of where we are today, Table 1, provides each state's lab testing requirements (where applicable). Because the State of Washington identifies its standards in greater detail, we illustrate its rules separately in Table 2.

Exhibit 1: Current State Lab Testing Requirements

	NOT REQUIRED	N/A HOME GROW	POTENCY	RESIDUALS	MICROBIAL	PESTICIDE	AFLATOXIN	HEAVY METALS	HOMOGENEITY	MYCOTOXIN	GENERAL CONTAMINATES
Alaska		X									
Recreational	X										
Arizona	(1)										
California	(1)										
Colorado	(1)		X						X		
Recreational			X	X	X						
Connecticut			X		X	X				X	
Delaware			X								X
D. C.											X
Recreational		X									
Hawaii		X									
Illinois			X	X	X	X				X	
Maine	X										
Maryland			X		X		X	X			X
Massachusetts			X		X	X					X
Michigan	X										
Minnesota			X	X	X	X		X			X
Montana		X									
Nevada			X		X	X		X			
New Hampshire			X	X							
New Jersey	X										
New Mexico			X	X	X			X		X	
New York							X				X
Oregon					X	X					
Rhode Island	X										
Vermont	X										
Washington		X									
Recreational	SEE EXHIBIT FOR SPECIFIC WASHINGTON STATE REEQUIREMENTS										

Source: Applicable State Marijuana Regulations; GWA Estimates (1) lab testing requirements under review by State for implementation

Exhibit 2: State of Washington Lab Testing Requirements (Recreational)

PRODUCT	TEST(S) REQUIRED	SAMPLE SIZE NEEDED
Flowers to be sold as usable marijuana (see note below)	<ol style="list-style-type: none"> 1. Moisture content 2. Potency analysis 3. Foreign matter inspection 4. Microbiological screening 	Up to 7 grams
Flowers to be used to make an extract (nonsolvent) like kief, hashish, bubble hash, or infused dairy butter, or oils or fats derived from natural sources	None	None
Extract (nonsolvent) like kief, hashish, bubble hash or infused dairy butter, or oils or fats derived from natural sources	<ol style="list-style-type: none"> 1. Potency analysis 2. Foreign matter inspection 3. Microbiological screening 	Up to 7 grams
Flowers to be used to make an extract (solvent based), made with a CO2 extractor, or with a food grade ethanol or glycerin	<ol style="list-style-type: none"> 1. Foreign matter inspection 2. Microbiological screening 	Up to 7 grams
Extract (solvent based) made using n-butane, isobutane, propane, heptane, or other solvents or gases approved by the board of at least 99% purity	<ol style="list-style-type: none"> 1. Potency analysis 2. Residual solvent test 3. Microbiological screening (only if using flowers and other plant material that failed initial test) 	Up to 2 grams
Extract made with a CO2 extractor like hash oil	<ol style="list-style-type: none"> 1. Potency analysis 2. Microbiological screening (only if using flowers and other plant material that failed initial test) 	Up to 2 grams
Extract made with food grade ethanol	<ol style="list-style-type: none"> 1. Potency analysis 2. Microbiological screening (only if using flowers and other plant material that failed initial test) 	Up to 2 grams
Extract made with food grade glycerin or propylene glycol	<ol style="list-style-type: none"> 1. Potency analysis 	Up to 1 gram
Infused edible	<ol style="list-style-type: none"> 1. Potency analysis 2. Microbiological screening 	1 unit
Infused liquid like a soda or tonic	<ol style="list-style-type: none"> 1. Potency analysis 2. Microbiological screening 	1 Unit
Infused topical	Potency Analysis	1 Unit

Source: <http://leg.wa.gov/CodeReviser/WACArchive/Documents/>

PATH TOWARDS STANDARDIZATION

Current Developments

The EPA has recently made provisions that would allow for the registration of pesticides for use in marijuana cultivation. This comes on the heels of the city of Denver's quarantine of harvests that had been cultivated with the aid of pesticides that were not included in the state's list of approved plant protection products. However, the EPA has not yet created a crop category for cannabis and since it remains illegal under federal law, pesticide manufacturers are understandably hesitant to expend the millions of dollars necessary to meet registration requirements.

Interestingly, New York State's medical marijuana program stipulates that lab testing facilities be licensed by the Federal Drug Enforcement Administration (DEA). This is significant in that it is the first instance of a federal agency potentially becoming directly involved in the administering of a state approved distribution of a Schedule 1 substance. What criteria the DEA will establish for licensing has not yet been determined and it is unclear if their involvement will fully materialize (we don't know if the DEA has agreed to New York State's requirement).

When taken into consideration along with stepped up federal governmental spending for marijuana research (discussed in The GreenWave Report), the fact that two federal agencies are now at least superficially involved in state marijuana programs, signals to us that there is an increasing acceptance of the inevitability of rescheduling or delisting and that comprehensive federal oversight will quickly follow.

What's Next?

The establishment of local and federal assurance standards will only be as effective as the ability of individual labs to test and grade along the process stream from flower to end product. Therefore, lab accreditation as well as protocol and standards, will certainly be a crucial element in the regulatory process. Some states have moved to adapt ISO 17025 which is an international standard for accreditation.

Presently, we note voluntary efforts being initiated by cultivators and laboratories committed to establishing systems of standards and accreditation procedures. The Association of Commercial Cannabis Laboratories (ACCL) describes itself as "a group of independent lab operators that have come together to address the lack of standards and practices in the medical and recreational marijuana industry evolving in North America today."

Another group, the Foundation of Unified Cannabis Standards (FOCUS) is presently endeavoring to "provide(s) a single, third party validated set of cannabis specific quality and safety standards broad enough to span all areas of the industry on all parts of the globe." To this purpose, FOCUS has drawn upon representatives from the cannabis industry, regulatory agencies, the public sector, and standards experts whom collectively will develop FOCUS' standards.

As we have mentioned in our prior report on the State of Colorado, we expect the legalized medical marijuana market will recalibrate and regain momentum, and as this sector establishes a more pervasive footprint, quality assurances guaranteed by reliable lab testing will become increasingly important. We

foresee the additional possibility that lab testing guidelines and protocols may evolve separately for medical marijuana from recreational use products, as a scenario whereby separate federal agency jurisdictions - for example the FDA governing medical use and the Department of Agriculture responsible for recreational use oversight could very well create a bifurcated system of quality control protocols. What is certain, however, is that the present patchwork of assurance standards is a work in progress and we can expect to see ongoing efforts by legislators, cultivators, labs, and third party advocates for an accepted gold standard specific to the formulation and distribution of cannabis products.

We believe that efforts intended to breach the gaps left by the lag in legislative initiatives to address the detailed requirements of quality assurance are positive steps towards gaining the trust of both consumers and governmental oversight, while also contributing in legitimizing any remaining associative stigma that adheres to cannabis related investment opportunities.

LAB TESTING REVENUES ESTIMATE

At this early stage, we thought it worthwhile to provide investors and other interested parties with an overview of the marijuana lab testing sector with a first glimpse as to what the potential market size could approach by the year 2020. In this regard, we build upon the conclusions drawn from our prior research efforts.

Methodology

We establish a baseline for our estimates, by determining the quantity of marijuana needed to meet our anticipated retail marijuana projections that we provide in *"The GreenWave Report: State of the U.S. Marijuana Industry – Current Trends and Projections"*.

If full legalization occurs in all 50 States and D.C., we expect that U.S. retail marijuana sales revenues could reach ~ \$35 billion/year by 2020. Our analysis provides full transparency of our revenue projections, determined state-by-state, for both the medical and adult use retail marijuana markets. This forecast does not suggest a terminal value but merely what we think retail revenues (and sales and excise tax collections) could look like during the first year in which marijuana is sold legally in all 50 states and D.C. Alternatively, assuming our view of the most likely progression of legalization, our revenue expectations would be approximately \$21 billion by 2020.

Our revenue expectations for lab testing are predicated on our assumption that edibles/concentrates comprise about 50% of retail sales (as drawn from data in GWA report *"The State of Colorado: Year One – The Co-Existence of Legalized Medical and Recreational Use Marijuana Markets"*).

Other assumptions:

- By 2020, lab testing will be standardized with stringent national testing requirements. Our surmised price point is \$450 per sample (currently, testing for one particular attribute can range from \$50 - \$70).

- \$1,100/pound for medical marijuana and \$1,700 for recreational use (wholesale prices). We hold these assumptions constant, recognizing that prices are likely to decrease over time but could be offset by a corresponding increase in demand. As it is not our intention to speculate here on future base commodity price fluctuations, we think it is reasonable for now to assume a relatively stable supply/demand effect upon our methodology.
- An Edible/Concentrates retail value of \$50/unit.
- 45% cost of sales for both medical and recreational marijuana.
- THC extraction is 20% of dried flower weight.
- Testing samples will be drawn from 5 pound batches.
- Conservatively, we make no additional provision in testing edible/concentrates.
- All consumption methods will be permissible in each state (i.e. New York regulations will ease)

Exhibit 3: Marijuana Lab Testing Revenues Estimates (testing only and excludes other revenue streams)

		MEDICAL		RECREATIONAL		REVENUES LAB TESTING	MAIN TESTING FACILITIES (not all inclusive)
		FLOWER	EDIBLES/ CONCENTRATES	FLOWER	EDIBLES/ CONCENTRATES		
1	CA	\$ 49,824.2	\$ 2,923.7	\$ 51,006.6	\$ 2,312.9	\$ 106,067.40	19% Steep Hill; SC Labs
2	TX	\$ 17,164.6	\$ 1,007.2	\$ 15,675.8	\$ 710.8	\$ 34,558.53	6%
3	FL	\$ 19,193.0	\$ 1,126.3	\$ 12,502.6	\$ 566.9	\$ 33,388.81	6%
4	NY	\$ 22,260.2	\$ 1,306.2	\$ 2,689.3	\$ 121.9	\$ 26,377.62	5% TBD
5	PA	\$ 6,208.2	\$ 364.3	\$ 16,158.7	\$ 732.7	\$ 23,463.97	4%
6	MI	\$ 16,402.2	\$ 962.5	\$ 6,874.5	\$ 311.7	\$ 24,550.93	4% True North Lab; Iron Labs; Cannalytics
7	IL	\$ 10,649.7	\$ 624.9	\$ 9,828.7	\$ 445.7	\$ 21,549.00	4% TBD
8	OH	\$ 10,213.8	\$ 599.4	\$ 8,301.4	\$ 376.4	\$ 19,490.95	3%
9	CO	\$ 6,097.5	\$ 357.8	\$ 10,810.7	\$ 490.2	\$ 17,756.23	3% Steep Hill, CannLabs
10	NJ	\$ 6,793.0	\$ 398.6	\$ 9,095.8	\$ 412.4	\$ 16,699.95	3%
11	NC	\$ 7,040.8	\$ 413.2	\$ 7,512.5	\$ 340.6	\$ 15,307.08	3%
12	MA	\$ 5,975.5	\$ 350.6	\$ 8,036.6	\$ 364.4	\$ 14,727.10	3% ProVerde
13	MD	\$ 5,789.9	\$ 339.8	\$ 7,382.3	\$ 334.7	\$ 13,846.78	2% TBD
14	VA	\$ 6,037.5	\$ 354.3	\$ 6,353.9	\$ 288.1	\$ 13,033.79	2%
15	GA	\$ 6,929.4	\$ 406.6	\$ 5,483.9	\$ 248.7	\$ 13,068.56	2%
16	WA	\$ 4,779.7	\$ 280.5	\$ 7,170.0	\$ 325.1	\$ 12,555.27	2% Steep Hill ; Green Leaf; Cannatest; Analytical360;
17	MN	\$ 5,016.9	\$ 294.4	\$ 5,955.1	\$ 270.0	\$ 11,536.49	2% Aspen Research ; Legend Technical Services
18	MO	\$ 4,623.5	\$ 271.3	\$ 5,511.4	\$ 249.9	\$ 10,656.10	2%
19	AZ	\$ 5,033.5	\$ 295.4	\$ 4,861.4	\$ 220.4	\$ 10,410.64	2% Cannext Labs
20	OR	\$ 4,795.4	\$ 281.4	\$ 4,850.0	\$ 219.9	\$ 10,146.67	2% Phylos Bioscience; Kenevir Research; Cascadia; Green Leaf
21	TN	\$ 4,921.6	\$ 288.8	\$ 3,485.3	\$ 158.0	\$ 8,853.67	2%
22	WI	\$ 4,300.5	\$ 252.4	\$ 3,468.7	\$ 157.3	\$ 8,178.86	1%
23	CT	\$ 3,136.2	\$ 184.0	\$ 4,322.8	\$ 196.0	\$ 7,839.15	1% CannLabs
24	KY	\$ 3,290.4	\$ 193.1	\$ 3,265.3	\$ 148.1	\$ 6,896.83	1%
25	LA	\$ 3,761.3	\$ 220.7	\$ 2,755.8	\$ 125.0	\$ 6,862.71	1%
26	SC	\$ 3,814.0	\$ 223.8	\$ 2,488.3	\$ 112.8	\$ 6,638.93	1%
27	AL	\$ 3,739.0	\$ 219.4	\$ 2,499.6	\$ 113.3	\$ 6,571.28	1%
28	MS	\$ 2,337.8	\$ 137.2	\$ 2,737.2	\$ 124.1	\$ 5,336.23	1%
29	IN	\$ 1,144.8	\$ 67.2	\$ 3,493.6	\$ 158.4	\$ 4,864.01	1%
30	IA	\$ 2,366.1	\$ 138.8	\$ 2,271.1	\$ 103.0	\$ 4,879.08	1%
31	NV	\$ 1,920.1	\$ 112.7	\$ 1,983.5	\$ 89.9	\$ 4,106.28	1% Steep Hill (via licensing); CannLabs; DigiPath (Expansion Plans)
32	NH	\$ 1,123.3	\$ 65.9	\$ 2,425.0	\$ 110.0	\$ 3,724.17	1%
33	UT	\$ 1,569.9	\$ 92.1	\$ 1,491.8	\$ 67.6	\$ 3,221.50	1%
34	OK	\$ 702.5	\$ 41.2	\$ 2,159.1	\$ 97.9	\$ 3,000.63	1%
35	HI	\$ 934.6	\$ 54.8	\$ 1,938.1	\$ 87.9	\$ 3,015.36	1%
36	WV	\$ 1,524.7	\$ 89.5	\$ 1,367.9	\$ 62.0	\$ 3,044.05	1%
37	RI	\$ 968.0	\$ 56.8	\$ 1,593.5	\$ 72.3	\$ 2,690.59	0.5%
38	NM	\$ 1,102.4	\$ 64.7	\$ 1,324.1	\$ 60.0	\$ 2,551.27	0.5% Steep Hill
39	KS	\$ 535.8	\$ 31.4	\$ 1,682.0	\$ 76.3	\$ 2,325.60	0.4%
40	AR	\$ 554.7	\$ 32.5	\$ 1,591.4	\$ 72.2	\$ 2,250.79	0.4%
41	ME	\$ 1,098.2	\$ 64.4	\$ 990.9	\$ 44.9	\$ 2,198.49	0.4%
42	ID	\$ 1,066.4	\$ 62.6	\$ 873.8	\$ 39.6	\$ 2,042.30	0.4%
43	D.C.	\$ 989.0	\$ 58.0	\$ 842.9	\$ 38.2	\$ 1,928.14	0.3%
44	DE	\$ 828.7	\$ 48.6	\$ 974.3	\$ 44.2	\$ 1,895.89	0.3%
45	NE	\$ 357.8	\$ 21.0	\$ 1,342.2	\$ 60.9	\$ 1,781.86	0.3%
46	MT	\$ 1,019.1	\$ 59.8	\$ 750.1	\$ 34.0	\$ 1,863.00	0.3%
47	AK	\$ 542.3	\$ 31.8	\$ 1,054.0	\$ 47.8	\$ 1,675.90	0.3%
48	VT	\$ 412.3	\$ 24.2	\$ 941.3	\$ 42.7	\$ 1,420.48	0.3%
49	ND	\$ 132.9	\$ 7.8	\$ 624.2	\$ 28.3	\$ 793.20	0.1%
50	SD	\$ 156.5	\$ 9.2	\$ 598.1	\$ 27.1	\$ 790.86	0.1%
51	WY	\$ 100.7	\$ 5.9	\$ 518.9	\$ 23.5	\$ 649.00	0.1%
		\$ 271,280.1	\$ 15,919.0	\$ 263,915.8	\$ 11,967.1	\$ 563,082.0	

Source: GWA Estimates

Other Revenue Streams

The standardization of laboratory testing of cannabis, from seed to end product, will not only assure a certainty of composition but also substantiate the collation of reference data. Such data analytics that tract the specific genetic attributes of targeted cannabinoids will be a vital element contributing to the broadening mainstream awareness and acceptance of the varied medicinal benefits afforded to patients.

As such, we see this accumulating data trove as becoming an increasingly valuable asset and substantial revenue stream for the most accomplished laboratories. Other consulting services should also contribute significantly to top line growth. For the purpose of our present projections we conservatively expect that lab testing will comprise 65% of revenues and that data analytics and other consulting and miscellaneous services will account for the remaining 35%. We would note that arguably the mix could flip in time with data analytics and other consulting services providing laboratories with their most robust revenue streams (and profit margins).

Based upon this methodology, we project revenues of \$553 million for lab testing alone under the scenario that full legalization occurs by 2020 (assuming current trajectory for legalization we expect \$450 million). If we then assume that lab testing accounts for 65% of revenues (which we believe is conservative) we would expect total lab testing revenues to approach \$866 million (\$688 million under our expected trajectory).

Cross Checking our Assumptions

As a back of the envelope cross check to our assumptions, we use the only publicly traded company from which we can draw any broad conclusion. The information available is through the first nine months of 2014 (Q4 has not been released). Using our methodology, and CannLabs stated market share of 50%, we are able to back into its 2014 full year from Colorado's 2014 implied recreational marijuana sales of \$305 M. Our calculations are included in Exhibit 4. In this exercise, we use average testing revenue of \$300 (assumes multiple attributes tested) as requirements are not as comprehensive as we foresee by 2020 – all other assumptions are consistent with what we stated above.

Exhibit 4: Cross Check to our Methodology

2014	Q1	Q2	Q3	Q4	FULL YEAR
CANL REVS	\$ 112.3	\$ 270.2	\$ 473.6	\$ 508.6	\$ 1,364.8
	<i>seq grow</i>	141%	75%	7%	
			CO Rec Sales		\$ 305.0
			% Flower		50%
			Flower Sales		\$ 152.5
			COGS		45%
			Wholesale		\$ 68.6
			Price/Pound		\$ 1,700.0
			# Pounds		40,368
			# Samples		8,074
			Price / Sample Batch		\$ 300.00
			Revenues (Flower)		\$ 2.42
			Edible/		\$ 152.5
			Concentrate		
			Price		\$ 50.00
			# Units		3,050,000
			Conversion to Pound		3,362.0
			# Samples		672
			Price / Sample Batch		\$ 300.00
			Revenues (Edibles/ Infused Product)		\$ 0.20
			Total Revenues		\$ 2.62
			CannLabs Mkt Sh		50% (1)
					\$ 1.31
			Full Year		\$ 1.36

Source: CannLabs; GWA estimates (1) Market share per CannLabs

INVESTMENT OPPORTUNITIES

It is easily seen that the business of lab testing is not a simple matter of merely assembling some test tubes and bunsen burners. The rush to fill the needs for testing ever increasing cannabis markets, whether for recreational or medical end uses is fostering the entry of a myriad of labs. Each concern claims top notch equipment and proprietary procedures and boasts teams of qualified technicians standing at the ready to fulfill the needs of cultivators, MIPS (Marijuana Infused Products) and other users.

The lasting success of these labs will hinge on their abilities to demonstrate scientific acumen, turnaround accuracy and an efficient means to aggregate data.

With many players currently jockeying for position and new entrants appearing as each state moves forward with legalization, the lab testing market will become increasingly saturated. The majority of lab facilities in existence today are privately held, and operations are limited to testing product grown within the confines of each state. In the event of Federal rescheduling, cultivators, extractors, and the various other cannabis product manufacturers will no longer be restricted to utilizing same state testing facilities and so we foresee the loss of the advantage that some current labs enjoy while operating as the only game in town.

Laboratories that are well capitalized, with accredited expertise and performance records and a clear executable plan into multiple states are arguably best positioned to achieve economies of scale when federal laws change. These companies will be the ones best positioned to endure and capture a slice of the revenue pie which could reach \$850 Million by 2020. Conversely, we believe that the lesser known “mom and pops” will either consolidate or go out of business as evolving industry standards intensify the challenges of sole proprietorship.

When the playing field levels off, an exit strategy for those still standing could entail an acquisition by one the larger agricultural testing labs (i.e. A&L, Primus, SCS Global). Alternatively, some may go public with a meaningful market capitalization.

Although it remains difficult to identify specific investment opportunities in the general cannabis industry, by narrowing the selection criteria down to what we consider one of the most compelling sectors, lab testing, we can see a developing profile of emerging opportunities. For example, firms that have a foothold or expansion plans into California have tremendous potential as we expect a market size in excess of \$100 M that could materialize by 2020. Entry into other top markets (Table 6) will also help solidify leadership positions.

Publicly Traded Companies

There are three publicly traded lab testing companies which we will touch upon briefly:

DigiPath (DIGP: OTC QB): Based in Nevada appears to be well capitalized with an attractive working capital profile (\$2.5 M as of 3/30/2015). In addition to operations in Nevada, the company indicates expansion plans into other states (not yet disclosed). The company also benefits from a diversified revenue stream through its media business (TNMNews) and other emerging consulting services.

Pazoo (PZOO: OTC PINK) : A licensee of Steep Hill through its ownership of Harris Lee and MA & Associates (both have agreements with Steep Hill). Pazoo is licensed in Nevada, Oregon and Colorado, with plans for expansion into other states.

CannLabs (CANL: OTC PINK) has established a presence in Colorado, Connecticut, and Nevada. The company currently licenses its software from a third party. As data analytics and other services become

more significant pieces of lab testers total revenue pie, CannLabs will likely need to develop its own proprietary software platform to remain competitive within its peer group.

Select financial data for these companies is included in Table 5 (we exclude revenues from DIGPD and PZOO as these companies have no reported results from lab testing).

Table 5: Marijuana Lab Testing Sector Comparison

TICKER	Latest Filing	MARKET			REVENUES				GROSS MARGIN	WORKING CAPITAL RATIO
		CAP	CASH	TOTAL DEBT	2014	2015	2016	2017		
DigiPath	DIGPD	3/31/2015	\$ 31.4	\$ 1.99	\$ -	NA				10.8X
CannLabs	CANL	12/31/2014	\$ 61.0	\$ 0.28	\$ 0.55	\$ 1.4			35%	0.2X
Pazoo	PZOO	12/31/2014	\$ 5.4	\$ 0.73	\$ 0.90	NA				0.8X
Steep Hill	Private					\$ 1.2	\$ 3.3	\$ 8.1	\$ 16.1	58%
	YoY Growth						175.0%	145.5%	98.8%	
	3 Yr CAGR								237.6%	

Source: DIGPD, CANL, PZOO, Steep Hill; GWA estimates

To help understand the potential market opportunity that currently exists for some of the established firms (based upon current business models), Table 6 provides some perspective and also quantifies the potential land grab in the remaining top 20 states (excludes other potential revenue streams).

Table 6: Potential Market Opportunities

STEEL HILL LABS	POTENTIAL MARKET OPPTY	% MARKET	CANNLABS	POTENTIAL MARKET OPPTY	% MARKET	GREENLEAF	POTENTIAL MARKET OPPTY	% MARKET	LAND GRAB TOP 20 MARKETS	% MARKET
CA	\$ 106,067.40		CO	\$ 17,756.23		WA	\$ 12,555.27		TX	\$ 34,558.53
CO	\$ 17,756.23 (1)		NV	\$ 4,106.28		OR	\$ 10,146.67		FL	\$ 33,388.81
NV	\$ 4,106.28 (1)		CT	\$ 7,839.15			\$ 22,701.94	4.0%	NY	\$ 26,377.62
WA	\$ 12,555.27			\$ 29,701.65	5.3%				PA	\$ 23,463.97
NM	\$ 2,551.27								MI	\$ 24,550.93
OR	\$ 10,146.67 (1)								IL	\$ 21,549.00
	\$ 153,183.12	27.2%							OH	\$ 19,490.95
									NJ	\$ 16,699.95
									NC	\$ 15,307.08
									MD	\$ 13,846.78
									VA	\$ 13,033.79
									GA	\$ 13,068.56
									MO	\$ 10,656.10
									AZ	\$ 10,410.64
										\$ 276,402.72
										49.1%

(1) Revenues through Licensing deals in these states

Source: Company data; GWA estimates

Privately Held Companies

We believe that amongst the privately held companies, Steep Hill Labs is well positioned for increased market share with potentially a very attractive free cash profile for a number of reasons (so far):

- The company already has a presence in 5 markets (including California) with a total revenue potential of \$153.2 Million from lab testing alone accounting for 27% of the total U.S. market

(assuming first year of full legalization is in 2020 -- \$235 Million if we assume 35% of revenues are derived from other sources).

- The company is able to minimize its Capex requirements through licensing deals.
- There is potential for significant margin expansion. Generally speaking, and as a point of reference, software companies enjoy very attractive gross margins (typically north of 80%) so we believe Steep Hill has ample room for margin expansion (currently 58%) when the mix shifts towards other revenue streams.
- A significant 3 year revenues CAGR is estimated at over 235%.
- An exceptional management team led by David Lampach one of Steep Hill's founders.

Other players that we consider having great potential (based on early leadership positions) include GreenLeaf, Analytical360, and ProVerde.

We will have further analysis on this sector as well as a more specific look at individual companies as the market matures and more data becomes available

APPENDIX

Types of Lab Tests

Potency Testing

As indicated in Table 1, potency testing is the most common which determines the level of Tetrahydrocannabinol (THC) in the cannabis product, and typically ranges from 5-20% (for concentrates, it can reach as high as 85%). Cannabinoids are also typically tested. Potency testing is of particular importance for medical marijuana patients to identify the proper strain needed for treatment.

Residual Solvent

Ensures that concentrates, those with very high THC content, (shatter, wax, hash oil, budder, etc.) are free of impurities. This can include testing for acetone, butane, ethane, ethanol, isobutane, isopropanol, methane, methyl-butane, propane, pentane, and hexane PPM values quantitated to below 20 PPM.

Microbial

Determines levels of molds, bacteria and yeast. Molds are ubiquitous, and small amounts are found in almost every sample. However, exposure to high levels of microorganisms such as molds and bacteria are known to cause health problems and can be particularly dangerous to patients that have existing medical conditions.

Pesticide

Pesticides contain neurotoxins that affect the brain and nervous system. As is required for other agricultural products that go to market, there are no USDA guidelines for residual pesticides in cannabis.

Due to cannabis' federal legal status, no pesticide residual tolerance limits have been established by the EPA but as we mentioned, it is looking into establishing protocols.

Aflatoxin

Testing cannabis for aflatoxins ensures marijuana products are free of biological contaminants that can endanger and compromise the health of individuals.

Heavy Metals

Includes testing for metals like arsenic, lead, mercury and cadmium that can find their way into cannabis plants through contaminated soil. Testing for the presence of these metals is a complex process. In Massachusetts, debate as to whether the state's requirements are too burdensome and cost prohibitive for testing heavy metals.

Homogeneity Testing

The Marijuana Infused Products (MIPs) industry has recently seen significant and rapid growth highlighted by the creativity of manufacturers in finding ways to infuse a myriad of products with cannabis. The success of these product is dependent upon ensuring stability and consistency, as well as meeting stringent health and safety testing mandates.

Current Methods of Lab Testing Cannabis

High Pressure Liquid Chromatography

When a sample is submitted to the lab for testing, the facility will typically conduct a visual inspection using a High-Magnification Dissecting Microscope for any molds or visible contaminants. The samples are then ground up, and solution is added to separate cannabinoids from the plant matter. Once the cannabinoid solution can be extracted from the sample (free of plant matter), it is run through a High Pressure Liquid Chromatograph. This is the key piece of equipment in the potency testing procedure.

Gas Chromatography & Thin Layer Chromatography

While there are many ways to test cannabis, High Pressure Liquid Chromatography (HPLC) is currently the most widely accepted method. Other techniques include gas chromatography (GC) and thin layer chromatography (TLC). HPLC is preferred over GC because it does not apply heat in the testing process, allowing cannabinoids to be measured in their naturally occurring forms. This means acidic (CBD-a, THC-a, etc.) and neutral cannabinoids (CBD, THC, CBG, CBN, etc.) can be differentiated and enumerated in a sample.

“High Pressure Liquid Chromatography (HPLC) is preferred over Gas Chromatography (GC) because it does not apply heat in the testing process, allowing cannabinoids to be measured in their naturally occurring forms.”

When testing cannabis with a gas chromatograph, heat is applied to the sample. This causes acidic cannabinoids and many pesticides to change their structure, rendering them impossible to detect. Therefore, this machine is only able to tell you the amount of neutral cannabinoids in a sample.

The amount of acidic cannabinoids is extremely important and should not be forgotten, especially in products such as edibles and tinctures. This is because acidic cannabinoids have not been activated yet in these products; that is left for your digestive system to do. For this reason, most reputable labs use HPLC as their core testing method.

Mass Spectrometers Help Test For Pesticides

In addition to testing for cannabinoid content, many labs utilize mass spectrometers (MS) to test for pesticides. The machine is able to detect many other types of particles through a heating process similar to GC. Gas Chromatography units equipped with mass spectrometers and thermal conductivity detectors (TCD) have proven to provide dependable lab results as well. This method is known as ‘Gas Chromatography-mass spectrometry’.

Real-time Polymerase Chain Reaction Testing

Another technique that has been utilized to test cannabis is called, “real-time polymerase chain reaction (PCR)”, which can be used to quantify the amount of certain molecules in a sample. The machine pinpoints precise quantities of fungus, yeast, mold or bacteria in a sample, while simultaneously quantifying targeted DNA molecules. When used correctly, these machines are able to determine strain lineage, or even count the number of specific terpenes present in a sample. While other methods of



testing may take days or weeks to produce results, real-time PCR machines provide test results in less than an hour

Source: www.medicaljane.com; CannLabs

Disclaimers

The Controlled Substances Act regulates, among other things, the cultivation, possession and distribution of certain controlled substances, including Cannabis and Marijuana which are illegal under federal law and in many states. This is true whether or not it is possessed for qualifying medical conditions, as provided for in certain state medical marijuana laws or if it is possessed within the few states that permit non-medicinal Adult (Recreational) Use.

There is nothing in this report written to offer any legal advice or to suggest any actions or choices the reader may make regarding participation in this industry or in any of the businesses discussed.

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