





&LWDWLEBQJ : ;X - =KDR / +X < %DL < HW DO OROHFXODU &SODPBOBODDWHV LQWRK &R;  
5HVLVWDQFH WR &LSURIOR[DFLQ DQG &HIRWD[LPH IURP 6ODXJKWHUHG &KLFNGL&DU

3DJH RI

0/67 DPSLFLOOLQ VXOEDFWWLSBR~RHOEDWGLPIHF  
0/67 ZDV SHUIRUPHG IROORZLQJ WKH JHQWDPLELO DQG FKORUDPSKHQLFRO  
0/67 ZHEVLWH KWWS POVW XFF LH WULPHWKR[SULP 6XOIDPHWKR[D]ROH  
SULPHUV(QWHULFDBKWPO ERFHVJLGLPH WHWUDF\FOLQH  
RQH LVRODWH ZDV IRXQG WR E  
6HYHQ FRQVHUYHG K&XRNHGSQJ KWHPL&HP DQG PHURSHQHP  
SXU( V&D&KUR&DOPRQHOVDULFDSQHJHG \$O&DOPRQHWV H[SUHVVHGHD 0'5 S  
VHTXHQFHG&P&W&K&UHQV&K&L&F&D &R /WG 6&DOPRQHWV ZHUH VXEW\SHG LQRV V  
&KLQD 6HTXHQFHV ZHUH &R&P&O&D&H&G&E&B&V&K&H 6 LQGLDQD 6 HQW&D&G&V&L&G&V  
ZHEVLWH KWWS POVW ZDUZLFN DF XN POVW 6&V&H&O&W&H&L&E&P 6 H&O&W&D&G&V&L&G&V  
6HTXHQFH 7\SHV 67V W&K&F&R&O&H&F&R&O&D&W&H&V ZHUH VKRZH&G LQ  
)LJXUH

5HVXOWV

\$QWLPLFURELDO VXVFHSWLELOLW\ WHVWLQJ

,Q WKLV VW&DOPB&B&O&D&W&H&V ZHUH  
FRQ}UP&B EH (6%/ SRVLWLYH DQG FR UHVLVWDQW WR DPSLFLOOLQ

\$QWLELRWLF FODVV	\$QWLPLFURELDO DJHQW	7RWDO Q	UDW&L&G&L&Q&D&D&W&H	HQWHU	W&G&M&S&K&L&P&X&L&X&P
3HQLFLOOLQ	\$PSLFLOOLQ				
&HSKDORVSRULQ	&HIRWD[LPH				
	&HIWD]LGLPH				
)OXRURTXLQRORQH	&LSURIOR[DFLQ				
	1DOLGL[LF \$FLG				
ODFWDP	\$PSLFLOOLQ 6XOEDFWDP				
\$PLQRJOLFRVLGHV	*HQWDPLFLQ				
3KHQLFRO	&KORUDPSKHQLFRO				
)RODWH SDWKZD\ L	Q&L&L&E&P&W&K&R&S&U&L&P 6XOIDPHWKR[D]ROH				
7HWUDF\FOLQH	7HWUDF\FOLQH				
&DUEDSHQHPV	,PLSHQHP				
	0HURSHQHP				

7DEOH \$QWLPLFURELDO &D&R&V&W&R&O&D&W&H&V ZLWK LQ VHURJURXS

'HWHFW&E&R 0R#5'5V DQG 3045 HQFRGLQJ W&K&H&F&U RT[\\$ R D&G&U&B&U&H IRXQG  
\$V VKRZQ LQ&E&D&X&H&O&H&V ZHUH IRXQG LQ DOO (6% V&H&O&W&H&G LVRODWH&G&H&Q&W&H&S&M&G  
SURGX&F&L&O&R&Q&W&R&O&D&W&H&V E\ 3&5 6HTXHQFH D&D&O&V&L&V U&H&Y&H&D&O&H&G V&L  
E&Q&D 0 VXEW\SHV E&Q&D 0 X&G&Q&Q&J&E&Q&D 0 Q 3ODV&P&R&F&S DQG 3&5 EDVHG SODVPLG UH  
E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q E&Q&D 0 Q  
0 Q \$O&O&D&O&P&R&Q&W&R&O&D&W&H&V FRQWDLQH&G GHWHF  
ORUHRYHU IRXU 45'5V SRU&O&V&L&X&W&O&W&L&R&O&M W&R&F&E&O&V&H&G SODVPLG D&D&O&V&L&V )LJ  
6 ) DQG ' 1 DPLQR DFLG VX&E&V&W&X&M&L&R&O&M&V&H&O&G&W&Y&K&Q RQH SODVPLG LVRODWH  
WR 7 6 DQG 6 5 DPLQR DFLG VX&E&V&W&L&X&W&L&R&Q&V U&H&Y&S&H&F&W&L&Y&H&O&V ZHUH IRXQG S  
LQ DOPR&V&O&P&R&Q&W&R&O&D&W&H&V ZLWK W&R H&F&H&S&W&L&R&Q&V Z&K&H&U&H&L&Q WKH  
OD&V&W&H&X&W&D&W&L&R&Q&V 7 6 DQG 6 5 ZHUH &D&V&H&O&V&L&G LQ S&O&D&P&R&O&D&W&H&V S&H  
Z&K&L&O&W&S&P&X&W&D&W&L&R&Q&V 3&5&R&X&W&D&D&G L&R&Q&V 7 6 H&Y&D&O&G&S&W&H WKH KH&W&S&U&R&J&O&H&X&U&M&V&U&R&R&Q&O&W  
ZHUH DEVHQW LQ LVRODWHV &+ VKRZH&G WK&D&W RI U&H&S&O&L&F&R&Q&V ZHUH G&H  
\$G&L&W&L&R&Q&D&O&P&B&O&B&O&D&W&H&V ZHUH G&H&W&H&F&W&H&G (R&F WKH ,QF), & ,QF7 ,QF. %  
SUHVHQFH DQG IUHTXHQF\ GLVWULEX&W&L&R&Q RT H&D&F&K 3045-HQFRGLQJ J&H&Q 1R  
TH&S\$ T&Q&U&S&D&Q&U&S&H&Q&H&V ZHUH GHWHF&W&H&G LQ DOO WKH LVRODWHV



&LWDWLRQJ : ;X - =KDR / +X < %DL < HW DO 0ROHFXODU &DOPRQWODWHV LQWRK &R;  
 5HVLVWDQFH WR &LSURIOR[DFLQ DQG &HIRWD[LPH IURP 6ODXJKWHUHG &KLFNRL&DU

3DJH RI

,QF+, Q ,QF+, Q ,QF\$ & Q 0RUHFYH,\$6 QRI LVRODWHV ZHUH IRXQ  
 DQG ,QF)UHS Q UHSOLFRQ W\SHV ZHUH BOWKRQIWH\$XHQWO\ SUHVHQW W\SHV

Isolate	Plasmid Profile			ESBLs					QRDR			PMOR					Replicon Types										Antimicrobial Resistance										ST	Serotype		
	337 kb	173 kb	33 kb	CXA-M-23	CXA-M-14	CXA-M-24	CXA-M-65	CXA-M-130	g74(S83F)	g74(D87N)	gacC(S15S)	gacC(S88R)	gmrB	gmrS	aac(6)-Ib-cr	qacA	qacB	AC	FIA	FIB	FIIAs	Frep	H1	H2	II-ly	AMP	SAM	CAZ	CTX	IPM	MEM	SXT	GEN	TET	CP	NAL			CHL	
CH1																																						17	Indiana	
CH2																																							17	Indiana
CH3																																							17	Indiana
CH4																																							17	Indiana
CH5																																							17	Indiana
CH6																																							17	Indiana
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CH58																																							17	Indiana
CH59																																							17	Indiana
CH60																																							11	Enteritidis
CH61																																							11	Enteritidis
CH62																																						34	Typhimurium	

)LJXUH KHDW PDS VXPPDU\ RI WKH VFKHPDWS\$R, (KDFLQ) WKH FXVQW DROVHD \$G D30  
 LGHQWL}B65 DQG '1\$ VHTXHQFLQJ FRUHVSRQGLQJ ,QF\$ & Q 0RUHFYH,\$6 QRI LVRODWHV ZHUH IRXQ  
 6DOPRQWODWHV IURP FKLFNHQ FDUFDVVHV LQ 4LQJGDR &KLQD %ODFN VTXDU  
 45'5 PXWDWLRQV DQG 3045 JHQHV WKH ,QF W\SHV DSGRYKLVFRUHVSRQGLQJGGQDQW  
 DUH ODFNLQJ LQ WKH FRUHVSRQGLQJ EDFWHULDO LVRODWH \$QWLPLFURELDO  
 \$PSLFLOOLQ VXQHYDWDL7, &LSURIOR[DFLQ DQG &HIRWD[LPH IURP 6ODXJKWHUHG &KLFNRL&DU  
 \*(1 \*HQWDPLFLQ 7(7 ZHUH SRFRF\$EOD &BL[LF DFLG &+ &KORUDPSKHQLFRO

&RQMXJDWLRQDO WUDQVIHU RI SODWQLGPHQFRGLQD & 7JHQV DQGLFLQ WHWUD  
 3045V JHQHV FDUFDVVHV LVRODWHV DGGLWLRQ WR FHSURORVSRQGLQJ DQG WUD  
 WR WKH FOLVWUDLQ LVRODWHV  
 2I 6DOPRQWODWHV WHVWHG IURP RQ







&LWDWLBQJ : ;X - =KDR / +X < %DL < HW DO 0ROHFXODU &BDBRQWBOODYDHWLZQWRK &R;  
5HVLVWDQFH WR &LSURIOR[DFLQ DQG &HIRWD[LPH IURP 6ODXJKWHUHG &KLFNGL&LDU

3DJH RI

5HIHUHQFHV

&OLQLFDO DQG /DERUDWRU\ 6WDQGDUGV  
VWDQGDUGV IRU DQWLPLFURELDO VXFVHS  
QIRUPDWLRQDFXLSOFFHQW 0 6 &/6,  
DWRU\ SURGXFLQJ 6DOPRQHOD 6 1\H. +DZNH\ 3  
FDUFDVVHV IURP SRXOWU\ VODXJKWHUKRX  
HWHFWLRQVWK EODD; 0RQHFUEHPXOWLSO  
3DWKRJ 'LV  
&KLX /+ &KLX &+ +RUQ <0 &KLRX &+ /H\U\$XGHW%DUVDERLV \$ ODUWHO -/ &KDVOX  
&KDUDFWHUL]DWLRQ RI PXOWL GUXJ UHVWLOLW\ EDPRQHWLQDWHURYPDURVRODV  
GLVHURWOHU FKLFNHQV DVVRFLDWHG ZLWK YLKRWHORFHWKGDVXWROVWRY 6DOPRQHOOD  
OLFURELRO KLJKRURTXLQRORQWUDHQYVSDVWLP  
(XURSHDQ )RRG 6DIHWH\$XWRBHDV\8QLRQ V&RPRWKHU  
UHSRUW RQ WUHQGV DQG VRXUFHV RI ]RRG  
ERUQH RXWEUHDNV LQ ( )6\$ -  
:DQJ < &DR & \$ODOL :4 &XL 6 /L ) HW DQJ\PH \$QWLPLFURELDOV &KHPRWKHU  
DQWLPLFURELDO VXFVHSWLELWLW\ RI IRRG  
SURYLQFHV LQ &KLQD IURP WR ((FH  
'LV  
=KX 0 &XL 6 /LQ / ;X % =KDR - HW DO &DUDPRVLY \$RIWKHDLHWLBOOD / )DOE  
RI GLDUUKHD LQ RXWSDWLHQWV LQ +H  
,QIHFV OHWKRGV  
:DQJ 6- 'XDQ +/ =KDQJ : /L -: \$QDQYUWRQ %DFWHDU\$DQJ \*3 =XFFDUHOOL \$-  
IRRGERUQH GLVHDVH RXWEUHDNV LQ &KLQD  
,PPXQRO OHG OLFURELRO :DQJ - 6WHSKDQ 5 .DUF]PDUF]N 0 <DQ 4  
&OHPHQWH / 0DQDJHLUR 9 )HUUHLUD ( -  
2FFXUUHQFH RI H[WHQGHG VSHFWUXP  
RI 6DOPRQHOOD HQWHULFD VXEVS HQWHULFD  
IRRG SURGXFWV LQ 3RUWXJDO ,QW - )RRG  
6HLVHUW+LOW\ 0 3HUUHWHQ 9 (QGLPLDQL \$  
FHSKDORVSRULQ UHVLVWDQW JUDP QHJDWL  
HPHUJLQJ SUREOHP IRU KXPDQ KHDOWK" 'UX  
6DUNDU \$ 3D]KDQL \*3 &KRZGKXU\ \* \*KRVK  
\$WWULEXWHV RI FDUEDSHQHPDVH HQFRGLQ  
IURP DQ H[WHQVLYHO\ GUXJ UHVLVWDQW  
6HQVHQ)EHRQW OLFURELRO  
%DL / /DQ 5 =KDQJ ; &XL 6 ;X - HW DO  
,VRODWHV IURP &KLFNHQ DQG 3LJ 6ODXJK  
&LSUR - RQBL&HIRWD[LPH &R 5HVLVWDQW 6  
+HQDQ &KLQD 3/R6 21( H  
.XDQJ ; +DR + 'DL 0 :DQJ < \$KPDG , HW  
DQWLPLFURELDO VXFVHSWLELWLW\ RI 6DOPRQHOOD VSS  
LQ &KLQD )URQW OLFURELRO  
1RGD 7 0XUDNDPL . (WRK < 2NDPRWR )  
,QFUHDVH LQ UHVLVWDQFH WR H[WHQGHG V  
LVRODWHG IURP UHWDO FKLFNHQ SURGXFWV  
&DQWµQ 5 \*RQ]£OH] \$OED -0 \*DO£Q -&  
DQGLVXV\URQW OLFURELRO  
+DUURLV ' %UHXUHF 6 6HFN \$ 'HODXQ« \$  
FKDUDFWHUL]DWLRQ RI H[WHQGHG VSHFWUXP  
6DOPRQHOOD HQWHULFD LVRODWHV LQ 'DN  
OLFURELRO ,QIHFV 2 2  
=KDQJ :+ /LQ ;< ;X / 'HODXQ« \$ /H +HOOR  
SURGXFLQJ 6DOPRQHOOD HQWHULFD VHURW  
SUHYDOHQW DPRQJ IRRG SURGXFLQJ DQLPD  
%DL / =KDR - \*DQ ; :DQJ - =KDQJ ; HW  
GLYHUVLW\ RI 6DOPRQHOOD HQWHULFD VHURW  
UHVLVWDQFH WR DGL&HIRWD[LPH IURP SDWZLS  
SURGXFLQJ DQLPDQV LQ &KLQD \$QWLPLFURELRO  
/L / /LDR ;3 /LX == +XDQJ 7 /L ; HW DO  
:DQJ < &KHQ 4 &XL 6 ;X ; =KX - HW DO  
FKDUDFWHUL]DWLRQ RI 6DOPRQHOOD LVRODWHV  
%HLMLQJ &KLQD )RRGERUQH 3DWKRJ 'LV  
0DORUQ % +RRUIDU - %XQJH & +HOPXWK  
RI WKH DQDO\WLFDO DFFXUDF\ RI 6DOPRQHOOD  
VWDQGDUG \$\$\$O (QYLURQ OLFURELRO

